Toward a Model for Explaining Secondary School Completion in Vietnam

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Dedication

I dedicate my dissertation to my beloved parents, Jin-Jeon Kim and Sun-Rae Song, who have sacrificed their lives for their seven children. Father and Mother, I am so grateful and fortunate to be born as your child. 사랑합니다.

Abstract

The purpose of this study is to examine the relationships among household, individual, and commune factors and secondary school completion in Vietnam. The study involves a secondary data analysis of the 2006 Vietnam Living Standards Survey which contained extensive variables in its education section.

The findings from regression analyses are as follows. First, academic achievement of students is the strongest factor among nine independent variables, having a statistically significant positive association with secondary school completion at the national level. Second, economic status, a composite variable of household income, expenditures for schooling, and commune wealth, has a statistically positive relationship with secondary school completion at the national level. Third, parents' education level is another positive factor associated with secondary school completion at the national level. Fourth, wages in rural areas have statistically negative relationship with lower secondary school completion. Fifth, there is no statistical association between secondary school completion and gender, ethnicity, and residence (rural/ urban).

The first three findings should be interpreted with caution due to specification error and the nature of their bivariate correlations. It appears that the impact of academic achievement may be biased upwards because missing data were not random. In addition, the economic status and parents' education level variables are statistically significant factors but this result is obtained when academic achievement was removed from regression analyses because of considerable missing data. Based on bivariate correlations, these three variables show only moderate and weak relations, suggesting that Vietnam is

doing relatively well in providing secondary education for all except for those in remote areas (particularly diverse ethnic groups). Though this study finds no statistical relationship among ethnicity, residence, and school completion in regression models, there is considerable mean difference in secondary school completion by ethnicity and residence in descriptive statistics which has important implications for national educational policy. Based on the findings of this study, various other important policy implications are discussed.

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Glossary of Acronyms and Vietnamese Terms

AIDS: Acquired Immunodeficiency Syndrome

BOET: Bureau of Education and Training

DHS: Demographic and Health Survey

DOET: Department of Education and Training

Đổi Mới: Renovation in Vietnamese

EA: Enumeration Area

GSO: General Statistics Office

HIV: Human Immunodeficiency Virus

IQ: Intelligence Quotient

LSS: Lower Secondary School

MAR: Missing at Random

MCAR: Missing Completely at Random

MOET: Ministry of Education and Training of Vietnam

NMAR: Not Missing at Random

OECD: Organization for Economic co-operation and Development

SPSS: Statistical Package for Social Sciences

UNESCO: United Nations Educational Scientific and Cultural Organization

USS: Upper Secondary School

VLSS: Vietnam Living Standards Survey

VND: Vietnamese Dong

Map of Vietnam

CHAPTER ONE: INTRODUCTION

The revised Education Law in Vietnam (UNESCO, 2007) verifies that primary education and lower secondary education are universal educational levels that are compulsory for all children aged 6 to 14. The law requires the financial support and the exemption or reduction of school fees and other school expenses for the disadvantaged, poor, and ethnic minority students.

In addition, the Vietnam National Education All Action Plan 2003-2015 confirms that achieving universal lower secondary education for all students by 2010 is a top priority (Ministry of Education and Training of Vietnam, 2003). The plan further states that Vietnam must eliminate gender disparity and ethnicity disparity by 2015 at the school level. According to the plan, a lower secondary education aims to help pupils consolidate the outcomes of their primary education and acquire the general knowledge necessary to continue to upper secondary education or to vocational training schools.

In contrast to Vietnam's rigorous efforts on lower secondary school completion, there have not been many targeted national plans for universalizing upper secondary school. Though the law defines upper secondary school as vital to providing substantial skills and knowledge (UNESCO, 2007), enabling students to move to tertiary education or to smoothly transition to work in a knowledge-based society, equivalent attention has not been shed on it.

While the secondary education system continues to expand, the enrollment rate of secondary school students appears to drop significantly from lower secondary school to

upper secondary school. For example, the net enrollment rate for lower secondary school was 78.8 % in 2006 while that the net enrollment rate for upper secondary school was 53.9 % (London, 2011). London (2011) further states that the government aims to "universalize" lower secondary education by 2010, but as of 2008, only 63 % of the provinces in Vietnam are on track.

This study seeks to identify household, individual, and commune[1] factors associated with the completion of secondary school in Vietnam and to explore the use of these factors in the development of a prediction model to help identify students more and less likely to complete secondary school. This study offers a unique contribution regarding community factors that are often unexamined in many studies.

Problem Statement

Secondary school completion is an important issue for Vietnam because secondary school constitutes a stepping-stone for both tertiary education and the workplace. However, considering the primary education completion rate is over 92 %, the lower secondary school completion rate of only 74.8 % and the upper secondary school completion rate of 43.9 % are discouraging (UNESCO Institute for Statistics, 2007; World Bank, 2008). Given the government's consistent efforts to improve education and the rich Confucian traditions that highly value education and learning, the disparity in these figures has been significant enough to attract the attention of Vietnamese educators and policy makers (Pham & Fry, 2011).

[1] The smallest administrative unit of local government, a district-level town. The 'community' is an entity smaller than the commune. 'Community' refers to a group of households in a village, to the whole village in a commune, or to a clan of an ethnic group (Asiaforestnetwork, n.d.)

Several studies have demonstrated that significant regional, socioeconomic, and ethnic disparities remain. London argues (2010) that there is a 16 % difference in upper secondary net enrollment between urban and rural areas and a 33 % difference across eight regions[2]. According to Vietnam's household living standards survey (General Statistics Office, 2003), the gross enrollment rate for lower secondary school was 53.8 % for the poorest income group, compared to 85.8 % for the richest group, while for upper secondary school, the corresponding figures were 17.1 % and 67 %. In Vietnam, as is the case in many world contexts, girls in poor families are less likely than boys to progress to secondary school (Bélanger & Liu, 2004).

Bélanger & Liu (2004) pointed out that socioeconomic status and household characteristics affect girls' school attendance much more than boys. For example, it noted that "compared to the poorest families, girls in the richest families are 28 times more likely to go to school, whereas boys are only 14 times more likely" (Bélanger & Liu, 2004). In addition to the low school attendance of girls in general, members of ethnic groups other than Kinh (major ethnic group) continue to fall behind. This fact is due to physical remoteness, lags in developing public infrastructure (including schools) in remote areas, various forms of cultural and linguistic barriers, and more general discrimination (London, 2011).

School completion should be considered as critical an issue as access to education because school completion is directly related to individual productivity, family wellbeing, and socioeconomic development. For example, secondary school drop outs often do not

[2] London. J. (2010). *Net enrollment by level of schooling*. The study used Vietnam Household Living Standard Survey 2006 in eight regions: Red River Delta, Northeast, Northwest, North Central, South Central, Central Highlands, Southeast, and Mekong Delta.

obtain needed competencies and knowledge, making it difficult for them to procure high-skill jobs (Holsinger & Cowell, 2000). In addition, families of secondary school dropouts are often unable to recoup education expenditures (World Bank, 2005). A higher level of education attainment often translates to more highly paid job opportunities. Government and society in general benefit from education only if students complete the cycle of education for which they enroll. Failure to do so is tantamount to considerable losses in manpower development which Vietnam can ill afford at this stage of its national development.

If Vietnam is to substantially and permanently increase the number of students who complete secondary school, it is necessary to identify and understand what factors predict student completion. This study attempts to identify factors associated with students' completion of secondary school, and to explore the use of those factors in the development of a prediction model.

Background of Study

Education Structure of Vietnam

As Figure 1 shows, the education system of Vietnam is 5+4+3 (UNESCO, 2007). In general, children start their primary education at the age of six. Education at this level lasts five years and it is compulsory for all children. General secondary education is divided into two cycles: lower and upper secondary. Lower secondary consists of four years (grades 6 to 9) which are compulsory.

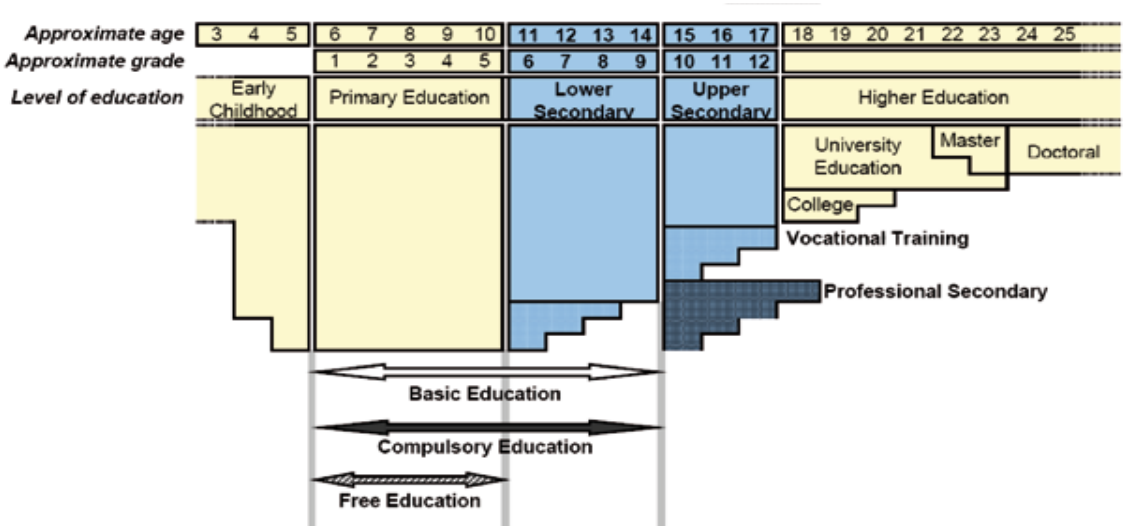

Figure 1. Education Structure of Vietnam
Source: UNESCO (2007). Secondary education regional information base: *Country profile Vietnam*

Students having successfully completed lower secondary education receive a certificate issued by the head of the Bureau of Education and Training in the district. After lower secondary, students can either go to upper secondary schools (grades 10 to 12) or proceed to a technical and vocational school. Students having successfully completed upper secondary school are eligible to take a final exam, and those who pass are awarded the diploma of secondary school graduation.

Types of Secondary Schools

Figure 2 demonstrates several different types of institutions offering secondary education. These institutions can be divided into (i) combined primary and lower secondary school, (ii) lower secondary school, (iii) combined lower and upper secondary school, and (iv) upper secondary school. Institutions offering education at the upper secondary level only are under the authority of the provincial Department of Education

and Training (DOET), whereas the rest fall under the district-level Bureau of Education and Training (BOET). Districts and communes manage lower secondary, primary, and early childhood facilities.

	Grade								Administrative authority
	5	6	7	8	9	10	11	12	
Combined PE+LS									BOET
Lower secondary									BOET
Combined LS+US									DOET
Upper secondary									DOET

Figure 2.Types of Secondary Schools
Source: UNESCO (2007). Secondary education regional information base: *Country profile Vietnam*

Đổi Mới (renovation) and Its Impact on Secondary School

Over the past two decades, Vietnam has undergone tremendous economic and societal changes. The launch of *Đổi mới* [3] has opened Vietnam towards the world market and to many other global influences (London, 2004).

After *Đổi mới,* one of the distinguishing features in the education sector has been the state's withdrawal from providing free education up to secondary education. Before *Đổi mới*, the Vietnamese government provided secondary education for free in order to expand educational access to all children. However, since the adoption of a new education policy in the aftermath of *Đổi mới*, access to secondary education is no longer free (Bélanger & Liu, 2004). Therefore, under the market regime, universal education is no longer paid for by the state but by its citizens.

[3] *Đổi mới*, which is literally means *change* and *newness*, is the Vietnamese Communist Party's term for reform and renovation in the economy. This term was coined in 1986 for a transition from the centrally planned Stalinist command economy to a "market economy with socialist direction," what is often referred to as market socialism (Turley & Seldon, 1993).

London (2004) demonstrated that the state increased fees continuously, while varying fees by region and between urban and rural. In both urban and rural communes, the costs of attending school increased with each grade. In addition to tuition, local (both district and commune) authorities also collected annual construction 'contributions', compulsory payments earmarked for school upkeep and renovation. General Statistics Office survey data on household education expenditures reveal that, by 1996-1997, school fees accounted for 46.1 % of yearly education expenditures per lower secondary student (London, 2004). Other education expenditures include books, transportation and after-school "extra-study." Moreover, at the lower secondary school level, the gap widened between rich and poor regions' and rich and poor households' access to education. In 1998, the wealthiest 15 to 17 year-olds were more than 12 times more likely to be enrolled than their poorer counterparts, up from an 11.5 % in 1993 (London, 2004).

Benefits of Secondary Education

Secondary education plays an important role in equipping adolescents and young adults with the necessary skills to become active citizens, take advantage of economic opportunities, and exercise their rights and duties (Holsinger & Cowell, 2000; World Bank, 2005). Investment in secondary education is beneficial in multiple ways, both for individuals and for society. Secondary education is associated with improved health, equity, earnings, and social conditions. It also buttresses democratic institutions and civic engagement.

An important benefit of increased education is its positive impact on health. In both developed and developing countries, a strong correlation exists between schooling and good health, measured by mortality rates or self-reported health status in general (Cave 2001; Mahy 2003). There is convincing evidence that young people in Africa who complete primary education are at reduced risk of HIV/AIDS, and this effect is even stronger for children who complete secondary education. In addition, secondary education has a general preventive impact: by providing children and youths with skills to critically process information, it equips them to make decisions regarding their own lives and to bring about long-term, positive behavioral change (De Walque, 2004).

Increased education, for girls in particular, results in a number of beneficial health impacts for children. Better-educated women are more likely than their peers to delay marriage and childbearing and to have fewer and healthier babies (DeJaeghere, 2005). The literature suggest a threshold effect of secondary schooling whereby women themselves are much more likely to be agents of normative and structural change when they have more education. Yet, studies from Egypt and Zambia suggest only girls that complete secondary or higher levels of schooling have a significantly lower risk of negative health outcomes and disease (El-Gibaly et al, 2002; Fylkesnes et al., 2001). Numerous studies have quantified the significant influence that women's schooling in particular has on fertility reduction, child mortality, and family nutrition (Behrman & Wolfe, 1987; Glewwe, 1999; Haveman & Wolfe, 1984).

Moreover, secondary education makes important contributions to improved earnings for students. In a market economy, wages tend to be highly correlated with

human capital development. In Vietnam, those who have less schooling are more likely to have low-wages jobs and also to be paid less in the same type of job (Desai, 2001). Desai (2001) demonstrates that wages earnings are higher for each successive level of schooling completed, in both rural and urban areas of Vietnam, and for both men and women.

At the national level, education plays a crucial role in fostering economic growth. Today's rapidly growing economies rely on the creation, acquisition, distribution, and use of knowledge and this requires an educated and skilled population (Keeley, 2007). Secondary education is a vital part of economic growth within the context of a globalized knowledge economy. Many studies have documented that a large pool of workers with secondary education is indispensable for knowledge spillover to take place and for attracting the imports of technologically advanced goods and foreign direct investment (Borenxztein, de Gregorio, & Lee, 1998; Caselli & Coleman, 2001; Xu, 2000). While extensive research has been conducted on the importance of completing schooling, most attention has been focused on the importance of completing primary school. Relatively fewer studies considered the completion of secondary school (World Bank, 2005).

Purpose of Study

The purpose of this study was to examine the relationships between household, individual, and commune factors and secondary school completion in Vietnam. Relatively fewer studies have examined the comprehensive relationships among these factors and both lower and upper secondary school completion. Several studies have

partly demonstrated an association between some of these factors and completion, such as the relationships between household factors and school completion, or between individual factors and school completion (Bélanger & Liu, 2004; World Bank, 2008) but much work remains. Given the role of education as a catalyst for economic and social development, improving our understanding of the determinants of secondary school completion is important. An understanding of the factors influencing completion at this level would enable policy makers to adopt strategies to improve the allocation of resources and to reform education policy with the objectives of improving completion at the national and provincial level. Moreover, understanding these factors would be useful for administrators at the district level to better support and monitor the implementation of school completion related policy.

This study fills the gap in research by developing a prediction model for secondary school completion based on characteristics at the household, individual, and commune level. The model is grounded in human and social capital theory, and in demand factors.

Significance of Study

One challenge in examining factors associated with secondary school completion in Vietnam is the limited scope of research on the topic in terms of level of analysis. A considerable number of studies looked at the relationships between household factors in particular (family income, parents' education, expenditures for schooling) and lower secondary completion, but not as many of these types of studies have considered upper

secondary school completion (Behrman & Knowles, 1999; World Bank, 2008). Major results of these studies have concluded that a few household factors are statistically significant correlates of completion.

In contrast, relatively little research has examined the association between commune factors and school completion. In the Vietnamese context, commune factors, particularly commune wealth, is critical to consider. Since population has been used as a dominant criterion in allocating public resources to the education sector, densely populated urban commune receive more education funds (Thanh & Long, 2004). Moreover, after *Đổi mới,* the education budget for secondary school (Bélanger & Liu, 2004) has been funded by private sectors such as the household and communes sectors. Therefore, it is more likely that a wealthy commune will contribute to funding for school construction since the Government of Vietnam aims to expand more secondary school constructions throughout the country (MOET, 2006). Consequently, to present study is therefore significant in that it provides an insight into the relationships between commune factors and secondary school completion.

One of the most comprehensive studies on lower secondary school completion was done by Glewwe and Jacoby (1998) using the 1992-1993 Vietnam Living Standards Survey (VLSS). They used various household and school level factors to explain the completion rate. The main finding was that both parental education and per capita family expenditures were associated with completion, and that distance to the nearest lower secondary school was the most significant factor contributing to completion rate (Glewwe & Jacoby, 1998). However, their study used data from rural areas only, thus

they provided no information on how these factors may affect school completion in urban areas.

This study fills a gap in the literature by including factors associating with secondary school at the household, individual, and commune level in both rural and urban regions. This study informs educators and policy makers of the factors associated with non-completion, upon which they can draw meaningful policy conclusions.

Research Questions and Hypotheses

This study examines the association of household, individual, and commune factors with secondary school completion in Vietnam. This study addresses human and social capital theories as well as demand factors to justify a selection of those factors to analyze the relationships with school completion.

The first research question is:

1) To what extent are household variables associated with secondary school completion?

Household variables include income, parents' education, expenditures for schooling, residence (rural or urban), and family type (single or two-parent). According to Becker (1964), parents invest money to improve their children's human capital because parents want to improve the prospective socioeconomic status of their children. Investment in schooling may be driven by the connection between higher levels of educational attainment and the ability to secure better, higher-paying jobs. Parents make a

decision about what to invest in education based on their current consumption and their view of the optimal investment in their child's human capital – secondary school completion in this study. Substantial literature indicates that the more expenditures for schooling, the lower the rates of school completion.

Therefore, this study considers variables of household income, parents' education level, and expenditures for schooling are included. Social capital theory argues that students from two-parent families are more likely to complete school than those from single-parent or no-parent families. The theory also indicates that students' residence, whether rural or urban has an impact on the distribution of capital-financial, cultural, and social resources and thus has implications for school completion (Bourdieu, 1986; Coleman, 1987).

The first research question led to five hypotheses.

Hypothesis (1): Household expenditures (proxy for income) is positively associated with school completion.

Hypothesis (2): Parents' education level is positively related to school completion.

Hypothesis (3): The more expenditures for schooling, the lower the rates of school completion.

Hypothesis (4): Students in urban areas are more likely to complete school than those in rural areas.

Hypothesis (5): Students from two parent families are more likely to complete school than those from single-parent families (or no-parent families).

The second research question is:

2) To what extent are commune variables associated with secondary school completion?

This study includes three commune variables to examine the relationships with school completion: commune wealth, distance to school, and wages for child labor. For commune wealth, Bourdieu (1986) and Coleman (1987) argue that students in low-income communities lack the capital resources necessary for providing high quality educational environment. Concepts such as distance to school and commune average wages for child labor (proxy for an opportunity cost which is a foregone cost of going to school) are drawn from human capital theory (costs). According to human capital theory (Bowman, 1971), school distance is regarded as a direct cost while opportunity cost is considered an indirect cost. Both costs are closely related to school completion (Weisbrod, 1971).

This research question guided three hypotheses.

Hypothesis (6): Commune wealth is positively related to school completion.

Hypothesis (7): Distance to school is negatively related to school completion.

Hypothesis (8): The higher the average wages for child labor in a commune, the lower the rates of school completion.

That is, the higher the wages available in a commune, the more likely students are to work to support their family instead of going to school.

The third research question is:

3) To what extent, are gender and ethnicity related to secondary school completion?

Due to the kinship system In Vietnam, sons traditionally have more privileges to go to school than girls (Bélanger & Liu, 2004). In addition to the lower enrollment rates of girls, there are the relatively lower enrollment rates of non-majority ethnic group. Aside from Kinh, the major ethnic group, Vietnam has 53 non-majority ethnic groups that consist of about 13 % of the population. This study identifies the relationships between gender and ethnicity and secondary school completion and compares the results to those addressed in existing literature. Two hypotheses follow.

Hypothesis (9):

Male students are more likely than female students to complete school.

Hypothesis (10):

Kinh students are more likely than non-Kinh students to complete school.

The fourth research question is:

4) To what extent, is academic achievement associated with secondary school completion?

Given that Vietnamese parents have higher expectations of their children's education due to Vietnam's rich Confucius culture, the last question examines the relationship between academic achievement and school completion. The last hypothesis is stated as below.

Hypothesis (11): Students of higher academic achievement will have a higher rate of secondary school completion.

Definition of Terms

Completion of lower secondary school in this study occurs when students enrolled in grade 6 (the first grade in lower secondary school) complete grade 9 (the last grade) in four years.

Completion of upper secondary school in this study occurs when students enrolled in grade 10 (the first grade in upper secondary school) complete grade 12 (the last grade) in three years.

Non-completion of lower secondary school (or dropout) in this study occurs when students enrolled in grade 6 do not complete grade 9 at the end of four years.

Non-completion of upper secondary school (or dropout) in this study occurs when students enrolled in grade 10 do not complete grade 12 at the end of three years.

Survival rate to grade is the percentage of a cohort of pupils enrolled in the first grade level in a given school year who are expected to reach a given grade (n) (UNESCO, 2006).

Educational attainment (or school attainment) is defined as the highest grade completed within the most advanced level attended in the educational system of the country where the education was received (OECD, n.d.).

As explained above, a ‘commune’ refers to the smallest administrative unit of local government in Vietnam. In the Vietnamese context, community is an entity smaller

than the commune. A ‘community’ refers to a group of households in a village, to the whole village in a commune, or to a clan of an ethnic group (Asiaforestnetwork, n.d).

Conclusion

This study examines the statistical association of household, individual, and commune factors with secondary school completion in Vietnam. This study is significant since relatively few studies have examined the comprehensive relationships among these factors and secondary school completion. In addition, this current research offers a unique contribution in understanding important community factors that are often unexamined in many studies. An understanding of the factors influencing completion may enable policy makers to adopt strategies to improve the equity of educational resource allocations and to reform education policy with the objective of improving completion rates and providing education for all regardless of socioeconomic status, residence, or ethnicity.

CHAPTER TWO: REVIEW OF LITERATURE

This study uses the theoretical foundations of human and social capital theory and supply and demand factors to guide the school completion rationale. This study explains students' secondary school completion in Vietnam by examining the role of selected characteristics of the students' household, individual, and commune. The study also develops a prediction model to help identify students who are more and less likely to complete secondary school.

Human Capital Theory

The theoretical approach underlying most empirical studies of schooling attainment is the human capital model developed by Schultz (1960, 1963), Becker (1964) and Mincer (1974). Human capital theory presumes that improvements in quality and productivity of the workforce are related to increased educational attainment (Keeley, 2007).

Although there are common elements, different scholars define human capital in different ways (Mačerinskienė & Viržintaitė, 2003). Some researchers (Heckman, 2000; Nerdrum, 1998) define human capital as skills and abilities that human beings acquire through formal and informal learning. Other researchers emphasize the importance of on-the- job training and health care for human capital accumulation (Becker, 1964; Schwartz, 1995). The definition of human capital used in this study is "the knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of

personal, social and economic well-being" (OECD, 2001). This study assumes that students acquire these knowledge and skills through school completion.

While different approaches are used to measure human capital, Mačerinskienė and Viržintaitė (2003) note that the widely used human capital measurement methods are: the sum of all expenditures as investments into human capital compounded by depreciation rate, adult literary, school enrollment rates, educational attainment, various qualification and competence tests, job titles, and labor-income based measure of future market and social returns discounted by an interest rate.

According to human capital theory, education is viewed not only as a consumption activity but also as a good investment. In this lifetime optimizing framework, an individual evaluates the direct and indirect costs of education and compares such costs with his or her expected return from schooling (Bowman, 1971). Investment in education ceases when the marginal cost and marginal benefit are equal (Weisbrod, 1971).

Human capital theory helps to define the costs and returns associated with education. Costs refer to what the individual and society give up in what it could otherwise produce (Bowman, 1971). Costs in this study included direct costs (e.g. tuition, fees for uniforms, learning materials) and opportunity costs (foregone wages). In the prediction model, direct costs were examined as a household factor (expenditures for schooling) and opportunity costs were examined as a commune factor (commune average wages for child labor). Most developed and developing countries agree that, investment in education is worthy since returns to education surpass costs of schooling (individual

productivity, socioeconomic development, health, etc). Returns (to education) are examined in terms of both private rates of return and social rates of return, as discussed below.

Rates of Return to Education

Private rates of return to education characterize all societies with formal education (Bowman, 1971). Bowman (1971) further states that the private rate of return on a given increment of schooling is the rate at which the education induced increments to income over a lifetime would have to be discounted to equate their value with the costs of a given increment of schooling as of the date at which those costs were incurred. Conceptually, measurement of social rates of return parallels that of private rates. The "social" rate of return is the rate of discount on the incremental stream of national income (attributable to a given increment in the population's education) that would equate the present value of that income stream with the presently incurred total costs of providing the education.

There is an abundant amount of literature on estimated rates of return to education based on Mincer's approach (Hartog & Brink, 2007) which derives results from equating the present value of two earnings streams that, each consists of constant annual earnings and differ only in the time when they start flowing.

Table 1 provides estimates of average social and private returns by level of education for countries grouped by their level of economic development (Psacharopoulos, 2004). Table 1 confirms the earlier well-documented declining rate of return pattern by level of education. In social rates of return, primary education is the most profitable educational investment opportunity, followed by secondary education.

Table 1
Average Returns to Investment in Education by Region Type and Level (%)

	Social			Private		
Region	Primary	Secondary	Higher	Primary	Secondary	Higher
Asia*	16.2	11.1	11	20	15.8	18.2
Europe/Middle East/North Africa*	15.6	9.7	9.9	13.8	13.6	18.8
Latin America/Caribbean	17.4	12.9	12.3	26.6	17	19.5
OECD	8.5	9.4	8.5	13.4	11.3	11.6
Sub-Saharan Africa	25.4	18.4	11.3	37.6	24.6	27.8
World	18.9	13.1	10.8	26.6	17	19

Source: Psacharopoulos (2004). Returns to investment in education: A further update
* Non-OECD.

The decline is the result of the interaction between the low cost of primary education (in comparison with other levels) and the substantial productivity differential between primary school graduates and those who are illiterate (Psacharopoulos,1985). Whereas the social rates of return follow a declining pattern by ascending level of education, the private rates are not only higher than social rates, but they increase after the secondary level (Psacharopoulos, 2004). This is why secondary school completion (and eventually tertiary education) needs special attention. Examining factors associated with secondary school completion is a significant issue that needs more research.

In developing countries, Psacharopoulos (2004) demonstrates that the Mincer-type average social rate of return for women in developing countries exceeds that for men by one percentage point as noted in Table 2.

Interestingly, the average returns for women in secondary school in nearly all countries surpass that for men, in contrast to the outcomes for primary and higher education.

Table 2
Average Social Rate of Returns to Educational Level by Gender (%)

Educational level	Men	Women
Primary	20.1	12.8
Secondary	13.9	18.4
Higher	11	10.8
Overall	8.7	9.8

Source: Psacharopoulos (2004). Returns to investment in education: A further update

These rate-of-return patterns have several implications for the shaping of educational policy. Expanding the provision of school places to include women is not only educationally equitable but financially beneficial to the society as well. This proposition is based on the evidence that the rate of return to women's education is at least as attractive as the rate of return on investment for men at the secondary education and overall level (Psacharopoulos, 2004).

Gap in Human Capital Theory

Since education is a strong factor in determining individual competence and national economic growth, 'human capital theory' becomes a basic theoretical framework to rationalize increased school completion probability. Applied to this study, human capital theory partly explains households' decision to keep their children at school, on the basis of costs of and returns to schooling. However, there is a gap in human capital theory which does not fully explain school completion. As noted by Li and Tsang (2002), while economic considerations are still relevant, school completion must also be understood in

terms of the interrelatedness of other factors such as family background, school, and social factors.

According to human capital theory, there should be no dropouts as long as returns are greater than costs. As noted earlier, international literature proves that returns to all levels of educational attainment surpass costs. Thus, students are expected to complete their education. But in reality, many developing countries have faced dropout problems at every level of school (Tilak, 2005; World Bank, 2008). For instance, due to economic difficulties, parents in a low-income household are unlikely to send their children to school even though they recognize future returns will surpass their costs. This feature is a key area that human capital theory does not explain well. Therefore, more diverse reasons for non-completion (dropout) beyond costs and returns need to be explored. Most of the international literature on determinants of school completion or educational attainment derives from supply factors (e.g. school factors) and demand factors (e.g. household factors) with gender focus such as girls (Connelly & Zheng, 2003; Glewwe & Jacoby, 1998; Sutton, 1998; Tietjen & Prather, 1991). A couple of these factors can be rationalized by social capital theory: family type (single-parent or two-parent) and commune effect (commune wealth, distance to school, and average wages for child labor in a commune).

Social Capital Theory

The theoretical approach on family background and commune effect in education attainment is the social capital theory developed by James Coleman (1987, 1988, 1990),

Robert Putnam (2000), and Pierre Bourdieu (1980, 1986). In an aggregated analysis of state level data in the United States, moderately strong positive associations were found between measures of social capital and desirable outcomes in terms of health, prosperity, crime, and equality (Croll, 2004). Putnam (2000) adds that positive associations were also found with measures of child welfare, including school attainment levels and staying in school.

Social capital theory lends itself to multiple definitions, interpretations, and uses. According to Bourdieu (1986), social capital is the "the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition" (p. 249). For Coleman (1990), social capital is defined by its function. Coleman explains it is a variety of different entities, having two characteristics in common: "they all consist of some aspect of a social structure, and they facilitate certain actions of individuals who are within the structure" (p.302). Putnam defines social capital as "connections among individuals – social networks and the norms of reciprocity and trustworthiness that arise from them" (p.19). These three definitions are slightly different but have commonalities in that social networks have value that is shared among people within the community. Bourdieu (1986) and Coleman (1987) addressed the fact that low-income and minority youth resided in communities lacking capital- financial, cultural, and social resources necessary for the provision of a high quality educational environment. This study primarily draws on Coleman's perspective because it analyzes common characteristics of

the commune: commune wealth, distance to school, and average wages of a child labor in the same commune.

Commune characteristics are important in this study because the population and wealth of communes in Vietnam differ significantly by their geographic location (London, 2004). A commune is the lowest administrative level in Vietnam that has clusters (villages). London (2004) stated that population has been used as a dominant criterion in allocation of public resources to the education sector. According to London (2004), the poorest 20 % receive just over 10 % of the total public funds (delivered mostly through primary education), while the richest 20 % receive more than 35 % (delivered through lower, upper secondary and tertiary education).

In addition, distance to school differs by each commune which would affect school completion differently. For instance, in a commune that has no neighborhood secondary school, few residents ever attend secondary school. In such a commune, the costs of sending children to distant schools are relatively high. Therefore, children living in communities without a school may have difficulty attending a secondary school or completing their schooling. This is particularly salient for girls, as the greater distance they have to travel to school the less likely they are to attend due to safety reason. Moreover, wages would differ by commune. It is assumed that the higher the wages available in a commune, the more likely students are to work to support their family instead of going to school.

Among numerous measures or aspects of social capital, family level includes but not restricted to two- parents family, residence, number of siblings, relationships between

parents and children, and frequency of conversation. Much of Coleman's (1990) discussion is at the family level and he is very concerned with the benefits children accrue from being brought up in families strong in social capital. According to Colman (1990), both parents present and the mother at home during a child's pre-school years contribute to child's social capital at the family level. This study primarily draws on Coleman's perspectives of social capital theory and chooses four variables: commune wealth, distance to school, wages, and family type.

Supply and Demand Factors

Even though there is no general consensus on which variables most strongly influence school completion, various studies do provide some indication of the variables that determine students' completion in secondary school, and these variables are explored in the development of a model for predicting students' success (completion). A considerable number of variables that affect educational participation have been addressed in the literature. These factors are called "supply and demand factors" (Bélanger & Liu, 1996; Connelly & Zheng, 2003; Sutton, 1998; Tietjen & Prather, 1999).

Tietjen and Prather (1999) reviewed the interventions that have been implemented by governments, donors, and other institutions to increase girls' access to, persistence in, and achievement at the primary school level. The study addresses three realms as affecting educational participation: macro-level societal factors; school factors (supply), and household factors (demand) (Tietjen & Prather, 1991). These three groups of factors

have been mainly used to explain barriers to girls' access, persistence, and achievement of education (Sutton, 1998; Tietjen & Prather, 1991), however a few researchers use these factors to study students' school completion (Bélanger & Liu, 1996; Connelly & Zheng, 2003; World Bank, 2008).

For example, Connelly and Zheng (2003) demonstrate that school completion is a function of three main factors: demand, supply, and government policy. The 'demand' factor refers to individual decisions made by students or their parents comparing the costs and benefits of staying in school, which are comparable to 'household factors' (Connelly & Zheng, 2003). 'Supply' factors refer to the availability and quality of the school (Connelly & Zheng, 2003), which are equivalent to 'school factors'. 'Government policy' can be as specific as governmental designation of school start age for and years of compulsory education and as general as policies on funding, curriculum, and governance, the latter of which are equivalent to macro-level societal determinants (Tietjen & Prather, 1991).

Tietjen and Prather (1991) further addressed macro-level societal determinants, which include national wealth, degree of industrialization, level of development, and degree of urbanization. These macro-level characteristics are generally not readily subject to alteration or manipulation through policy intervention, at least not in an immediate sense by educational entities (Tietjen & Prather, 1991). It is hard to measure the direct impact of national-level policies on secondary school completion in the model. Tilak (2005) supports Tietjen and Prather's argument by stating that the relative importance of

societal factors has been declining over the years due to development and modernization. However, the first two sets of factors, household and school, continue to have a very strong influence on children's enrollment and their continuation in schools (Tietjen & Prather, 1991). In the supply and demand model, this research examines only demand factors due to lack of data available for supply factors.

Household Factors

Several studies have examined the association between household factors and completion (Filmer & Pritchett, 1999; Khan, 2001; Thanh & Long, 2004; Tietjen & Prather, 1991). The most commonly used household factors include family income, parents' education, and expenditures for schooling.

Household Income

Low household income is an often cited correlate of higher non-completion rates (Downy, 1994; Dubow & Ippolito, 1994; Entwisle & Alexander, 1995; Ross, 2001; Smith, Books-Gunn & Klebanov, 1997). Household income is considered a critical predictor for secondary school completion since wealthy households tend to send and keep their children at school longer than poor households (Thanh & Long, 2004; UNESCO Institute for Statistics, 2014). Filmer and Pritchett[4] (1999) indicate that the difference between the richest and the poorest households in median grade attained by students age 15-19 is as high as 10 years of schooling in India and between 3 and 5 years in many of the developing countries surveyed. Because the poor have, by definition, a

[4] Their study is on educational attainment using household survey data from 35 developing countries.

low income and because private spending for education increases along with higher education levels, the poor find it hard to send their children to schools especially at the secondary level (Thanh & Long, 2004).

The survival rate of students in lower secondary school in Vietnam demonstrates a similar result. The World Bank (2008) provides grade survival rate for ages 10 to19 based on the Demographic and Health Survey's (DHS)[5] 2002 data in Table 3 below.

Table 3

Survival Rates among House Wealth

grade	Quint1	Quint2	Quint3	Quint4	Quint5
1	0.937	0.982	0.993	0.993	0.993
2	0.927	0.979	0.989	0.990	0.992
3	0.903	0.973	0.979	0.989	0.991
4	0.865	0.957	0.968	0.984	0.989
5	0.804	0.924	0.950	0.965	0.983
6	0.722	0.886	0.915	0.934	0.965
7	0.641	0.860	0.872	0.891	0.948
8	0.585	0.819	0.824	0.836	0.929
9	0.516	0.775	0.781	0.799	0.895

Source: World Bank (2008). Based on analysis of data from DHS 2002

The almost 38 % disparity in the lower secondary school survival rate[6] observed in Table 3, is explained by household wealth in Vietnam. There is a huge disparity in the

[5] The Demographic and Health Surveys (DHS) are large nationally representative household survey. The survey records data on school enrollment (for household members aged 6 to 25) and educational attainment (for household members aged 6 and above) as reported by respondents.

[6] These figures show the proportion of children of the cohort of 10- to 19- year- olds who have completed each grade at each age, using techniques adapted from "survival analysis." The technique estimates the proportion of the cohort that has completed a grade, adjusting for the fact that some students are still in school and we cannot observe their ultimate grade completed (the observation is said to be "right censored"). The figures enable the estimated grade-to-grade progression of a current cohort.

survival rate by household's wealth in Vietnam. Among 96.5 % of those from Quintile 5 (the richest households) at grade 6, 89.5 % of students have completed lower secondary school (grade 9) while among 72.2 % of those from Quintile 1 (the poorest households) 51.6 % of students have completed LSS.

However, these figures only show the mean difference in survival rate by household wealth. Other factors that may impact survival rates are not included. In addition, the figure does not explain to what extent household wealth accounts for variation in secondary school completion. Therefore, this study is necessary to fill the gap that previous literature has not examined.

Parents' Education Level

Studies have consistently shown that parental education level is related to the children's academic attainment (Bélanger & Liu, 2004; Blau & Otis, 1967; Brunello & Checchi, 2003; Kerckhoff & Campbell, 1977). More educated parents are more likely than less educated parents to send their children to school for longer period of time. The level of parental education is therefore expected to be one of the most powerful variables to predict students' continuing education (Thanh & Long, 2004).

Other studies document a significant positive association between parental education attainment and the educational attainment of their children. Li and Tsang's study (2002) states that low levels of parental educational attainment particularly mothers, act as barriers for the childrens' education attainment. A mother's higher education level is positively associated with a child's likelihood of initial and sustained

enrollment; it thus increases the chances that a child will complete their school cycle (Li & Tsang, 2002). Glewwe and Jacoby (1998) indicated parental education was associated with lower secondary school completion using the 1992-93 VLSS.

Expenditures for Schooling

As described above in the discussion of human capital theory, parents' decision to invest in schooling for their children necessitates a complex calculation of private rates of return (Tietjen & Prather, 1991). Holmes (1999) argues that many studies have identified the expenditures for schooling as a critical determinant for school completion since such expenditures not only concerns actual school fees but also includes payment of other dues like construction fund, club fees and other levies determined by the school (Bélanger & Liu, 2004).

Bélanger and Liu (2004) argue that after the introduction of fees for public education in 1986, a larger set of Vietnam's social policy reforms (*Đổi mới*) adversely affected the education burden of households'. When households were re-instituted as units of production, households were expected to share the cost of public services (Bélanger & Liu, 2004). Bray (1996) states that in 1993, only a few years after the introduction of schooling fees, households were responsible for 67 % of lower secondary education costs and 72 % of upper secondary education costs, respectively. This situation forms a striking contrast to the situation in China where households were responsible for less than 20 % of the cost of education during the same time period (Bélanger & Liu, 2004). However, Glewwe and Jacoby (1998) were critical of Bray's findings (1993),

indicating that the expenditures for schooling were not statistically significant based on 1992-93 VLSS data. The conflict between these results may be due to the time difference between the two data sets. The 1992-93 VLSS data used by Glewwe and Jacoby may not fully reflect the influence of *Đổi mới* which started in 1986.

Residence

Another dominant finding of the extant literature is that residence (rural or urban) is related to completion of secondary school, in that students from urban areas have been more successful in completing secondary school and are more likely to aspire to tertiary education.

According to a World Bank study of students enrolled in grade 1, 92.5 % of students in urban communes reached grade 6 and 82 % completed lower secondary school (World Bank, 2008). In contrast, a large proportion of students from rural families do not continue to lower secondary education: close to 87.8 % of rural students entered grade 6 and 74.5 % completed the school. Survival rate of students by region is getting increased as grades goes up. For example, a 3.3 % regional disparity in survival rate at the primary school level rose to 7.5 % at the lower secondary school level (World Bank, 2008).

The World Bank (2005) has expressed growing concern about the emergence of marginalized social groups in rural communities. Keeley (2007) supports this concern, noting that marginalized communities lack links to mainstream society and with relatively low levels of education are unable to fully enjoy their rights to education, and

better job opportunities which offset intergenerational circle. Poverty does not only mean an absence of money; it means a lack of resources – education, health, useful social contacts – on which to build self-competence as well as economic success.

Family Type

As noted above, in the description of social capital theory, family type is related to academic attainment, in that students from two-parent families are generally more successful in completing school, and are more likely to aspire to further education. In addition, research indicates that children from single-parent families, and step families are more likely to drop out before completing high school (Gillett, 2004). Findings from a U.S. study on school attainment by family type revealed that 85 % of children from two-parent families went on to high school. In contrast, only 67.2 % from single parent families, and only 65.4 % from step-families continued on to high school. Conclusions drawn from the research suggest that the socioeconomic status of the mother is a strong predictor of a student's achievement and that stepparents may be less willing to expend resources on children's education. Vietnam may have a different context of family type compared to American case. Since relatively little attention has been paid on the association between family type and completion of secondary school, the current study provides a distinctive implication.

Academic Achievement

The majority of research studies consistently find that measures of higher academic performance are positively associated with secondary school completion (Alexander et al., 1997; Eccles et al., 1993; Ensminger & Slausarcick, 1992). Given that Vietnamese parents have higher expectations of their children's education than developing countries in South Asia, the higher performance their children achieve, the more likely parents are to keep them in school and complete their education.

Gender

Abundant literature argues that gender plays an important role in school completion. According to the World Bank (2005), families in many developing countries have a preference for educating boys over girls, given the better labor market opportunities for boys and the fact that girls in many societies are "married away" joining the husband's family and no longer providing for or living with their own families. Eshiwani (1985) states that if Kenyan and Zambian parents could afford the uniforms and the school fees for only one child, they would often send a boy to school than a girl. Eshiwani further argued that although such attitudes concerning the education of women are slowly changing but when faced with a choice, parents indicated a preference for sending a boy to school over sending a girl.

DeJaeghere noted (2005) that in terms of schooling, girls have benefited more than boys from their household's per capita expenditures increase, while they have suffered more than boys from an increase in direct expenditures for schooling. The

general preference for boys found among the most excluded groups in developing countries adds to the disadvantages experienced by girls.

In Vietnam, much evidence suggests that sons and daughters do not hold an equal status in the family due to the kinship system. Sons are very important to parents for social, economic, and symbolic reasons (Bélanger & Liu, 2004). Research on child labor in Vietnam observes that a substantially higher proportion of working girls, compared to boys and stresses the fact that working girls are more likely than boys to exceed 42 hours of work per week (Edmonds & Turk, 2002). Using the 1997-98 VLSS data, Bélanger and Liu (2004) further indicated that gender plays a role in determining why students do not complete school at the secondary school level. They find that gender is a statistically significant factor for explaining school dropout rates in Vietnam. They argue that the effect of gender on the likelihood of dropping out of school is greater as children become older.

The reduction of the gender gap does not mean that the problem is solved. The combination of being female and poor is the most limiting of all social conditions in Vietnam. Girls in poor families compete with their brothers for access to the limited resources allocated to education (Son et al., 2001). This result indicates that, in spite of small gender differences in school enrollment in Vietnam, after controlling for household characteristics, gender differences remain significant. If similar results arise from the VLSS 2006 data, the current policies of the Government of Vietnam will be proven to be inefficient.

Ethnicity

Ethnicity is another critical factor in educational attainment. Though Vietnam experienced tremendous economic growth and a remarkable expansion of formal education during the 1990s, the benefits of these improvements did not reach all Vietnamese (Rew, 2008). Glewwe et al. (2002) found that the poorest households including ethnic minority households did not benefit as much from Vietnam's economic boom as did wealthy, ethnic majority households.

According to DeJaeghere and Miske (2009), while primary and secondary enrollment rates in Vietnam show fair parity, these rates mask the disparities existing within certain ethnic groups. Data disaggregated by non-majority ethnic groups show greater gaps between minority and majority students (DeJaeghere & Miske, 2009). In 1998 nearly 65 % of Kinh were enrolled in secondary education, whereas only 4.5 % of Hmong, 9 % of Ba-Na, and less than 15 % of Xo-Dang and Dao students were enrolled (Baulch, et al., 2004).

While sufficient literature demonstrates that ethnicity is a critical factor to influencing school enrollment, few studies have identified the relationships between ethnicity and both lower and upper secondary school completion. The current study's attention on how ethnicity impacts upon school completion therefore draws closer attention to education equity issue and fills the gap in previous literature.

Commune Factors

The clustering of households or schools in a community, presents a condition of increased homogeneity in terms of morals, values, status, etc (Gillett, 2004). Because clustered individuals share certain characteristics, observations based on these individuals are not fully independent. This argument seems to be supported by South et al. (2003). The most basic shared unit is geographic area. For instance, families living next to each other share the same external environment, including the same local institutions, such as schools in the community.

Binder (1999) investigates community effects in the determination of desired schooling in a sample of more than 300 school children and their parents in three Mexican cities. The study concluded that community residence is a significant predictor of desired schooling of parents and children, even with comprehensive controls for child and family traits (Binder, 1999).

Inspired in large measure by Wilson's (1987) work, several studies have focused on children and adolescents residing in economically distressed communities versus those in wealthier neighborhoods and have explored the impact of neighborhood and community characteristics on various dimensions of youth educational attainment (South et al., 2003). Although the evidence is not entirely consistent (Evans, Oates, & Schwab, 1992; Plotnick & Hoffman, 1999), these studies tend to report higher rates of school dropout (Aaronson, 1997; Crane, 1991; Ensminger, Lamkin, & Jacobson, 1996; Foster & McLanahan, 1996), lower grades (Dornbusch, Ritter & Steinberg, 1991; Gonzales,

Cauce, Friedman, & Mason, 1996), and ultimately fewer completed years of schooling (Corcoran, Gordon, Laren, & Solon, 1992; Garner & Raudenbush, 1991) among children and adolescents residing in economically distressed communities than among youth in wealthier neighborhoods.

However, most of the research on community effects on educational attainment has focused on American students who have a different contextual background than students in Vietnam. Most of these studies use models of neighborhood effects (Jencks & Mayer, 1990), emphasizing the importance of peer group behavior for sustaining community-wide norms that either fail to reward or reinforce educational and academic success (Crane, 1991; Wilson, 1987). However, peer' effect in Vietnam is likely weaker than that of American families since Vietnam is much more family-oriented, hierarchical, and collective in its culture and norm.

Little research on school completion study has been conducted based on the commune level in Vietnam. One of the few studies on the relationships between commune effects and completion rates of secondary education has been conducted, and that study included only six regions[7] (Desai, 2001; UNESCO, 2007; World Bank, 2008). Consequently the study is unlikely to provide a clear snapshot at a lower administrative level such as the commune and therefore ignore possible heterogeneity within the same region. The incomplete picture makes it difficult for the Vietnamese government to define challenges and initiate interventions effectively with regard to school completion. Research on the association between commune factors and completion of secondary school would therefore be beneficial for the government to devise locally sensitive

[7] Northern Uplands, Red River Delta, North-Central Coast, Central-Cost, Southeast, and Mekong Delta

intervention strategies. To address this association, the present study includes three variables: commune wealth, distance to school, and wages.

Commune Wealth

Commune wealth affects basic physical infrastructure, such as schools, health care, type of road and transportation, etc (London, 2004). Because the commune is the lowest administrative level in Vietnam, national educational policy is often administrated at the commune level. There are two important Vietnamese educational and social policies enacted through the commune level: allocation of public resources to the education sector and Program 135.

First, as discussed earlier, the population has been used as a dominant criterion in the allocation of public resources to the education sector. According to London (2004), the poorest 20 % receive just over 10 % of the total public funds, while the richest 20 % receive more than 35 %. Therefore, the population and wealth of communes in Vietnam can differ significantly, and it is likely that low-income communes (particularly in rural areas) will have fewer schools than high-income communes, which in turn affects school completion. To help poor mountainous communes, in which the ethnic minority mostly resides, to overcome poverty, the Vietnamese government initiated Program 135 (P135).

P135 was established in 1998 to target the most vulnerable communes and promote access to basic infrastructure, such as schools, and raise awareness for better living standards (Quan, 2009). One of the significant impacts of P135 was to build schools and ensure better access to primary and secondary schools. Once the selected

communes received money from P135, they were able to use it for building roads or schools as needed and redistribute the money to commune residents. Therefore, P135 affected commune wealth as well as household wealth to a certain extent.

Ultimately, the commune in which students reside and that commune's wealth are likely associated with students' completion of secondary school. As stated above, after *Đổi mới,* the educational budget for secondary school has been increasingly funded by private sectors including households, commune, etc. A commune's wealth status may therefore relate to secondary school completion.

Distance to school

Holmes (1999) argues that distance to lower secondary school is a significant determinant of final school attainment, stating that a long distance to school could result in increased direct costs (such as bus fare) for schooling. Glewwe and Jacoby (1998) indicate that in Vietnam, the distance to the nearest lower secondary school is one of the most significant factors contributing to the LSS completion rate. According to central place theory, the further apart the towns are, the less movement is possible between the two towns (Christaller, 1966). In this current study, the wider the distance between school and commune, the less likely students are to attend school. Distance to school also increases the opportunity costs incurred by families for school attendance and increases the security risk to children walking to school (Tietjen & Prather, 1991). Accordingly, parents may want their daughters, for example, in school but worry about their safety

away from home. The results of having to travel a long distance to school adversely affect a student's school completion (Bailey et al, 1995; Kim, 2002; Ohsako, 1997).

One study of rural schools in Mexico estimated that proximity to a secondary school increased attainment by more than one full year (World Bank, 2005). In another study of 22 countries, Filmer (2003) found a strong negative correlation between the distance to a primary school and primary school participation of both boys and girls from the poorest 50 % of households in about one-third of the countries. In an extensive review of research, Lockheeed and Verspoor (1990) concluded that "the single most important determinant of primary school enrollment is the proximity of a school to primary-age children." Notwithstanding the importance of empirical evidence, few scholars have attempted to examine how distance to school affects secondary school completion.

Wages

The concept of a commune average wages for child labor is drawn from human capital theory. According to the theory, wages is considered an opportunity cost (the foregone wages).

The current research hypothesis is that the higher the available wages, the more likely students are to work to support their family. Tietjen and Prather (1991) demonstrated that in many developing countries the contributions of girls far exceed boys in household productivity. Time-budget studies in rural areas of Yemen, Bangladesh, Botswana, Burkino Faso, Nepal, and Java found that girls have greater and earlier

responsibilities for production both within and outside the home, and that much of their time is devoted to household duties- such as water-carrying, fuel collection, food processing, and child care (Ashby, 1985; Charnie, 1983; Khan 1989; McSweeney & Freedman, 1980; Shrestha et al., 1986; Tilak 1989). In contrast, in Latin America and Botswana and Lesotho, where labor opportunities for boys are high, boys often will not attend or will be withdrawn from school.

A theory of cost-effectiveness can partially explain the lower enrollment in secondary schools than in primary school in Vietnam (DeJaeghere, 2005). DeJaeghere adds that children of primary school ages are not capable of making significant contributions to household income. However, children in the secondary school ages are physically more capable of contributing to household work and/or participating in income-earning activities, and real tradeoffs exist between increasing current family incomes and increasing children's future incomes, some part of which might benefit parents (DeJaeghere, 2005).

Prediction Model

For this study, a prediction model was developed based on the impacts of the variables (discussed under human capital theory and social capital theory) and demand (household) factors emphasized in extant literature on school completion. The prediction model is depicted on the next page.

Prediction models have been used in various fields of research. Environmentalists, weather forecasters, agricultural experts, census bureau personnel, and medical

researchers have used prediction models as a part of their everyday work (Gillett, 2004). Prediction models have actually been utilized for decades in the education field, and various studies such as those conducted by Chou and Huberty (1990), Cowen and Fiori (1991), and Trusty et al. (2000) are among those that have utilized prediction models in the field of education. According to Gillett (2004), the general purpose of prediction models is to learn more about the relationships between several independent variables and a dependent variable.

Among other techniques, prediction models utilize multiple regression analysis to establish a regression line from which predictions are made. In this study, research questions include "what variables are associated with completion of secondary school?" If the relationships are strong, the model allows the researcher to predict which students are most likely to complete secondary school and which students are less likely to do so. Gillett (2004) further notes that in the education field, prediction models are often used to identify students most likely to succeed in various academic programs. In this study, success of completion is identified by the model as shown in Figure 3.

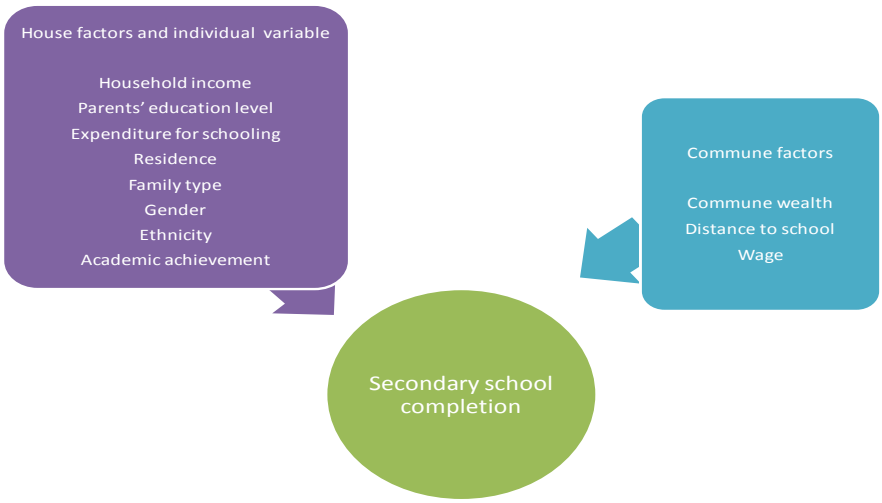

Figure 3. Prediction Model for Secondary School Completion

Conclusion

In the previous chapters, the importance of secondary education is addressed. Secondary education plays a critical role in equipping adolescents and young adults to become active citizens, to exploit economic opportunities, and to exercise their rights and duties (Holsinger & Cowell, 2000; World Bank, 2005). At the national level, secondary education plays a crucial role in fostering economic growth. Today's rapidly growing economies rely on the creation, acquisition, distribution, and use of knowledge, and this requires educated and skilled manpower (Keeley, 2007).

Many studies have documented that a large pool of workers with secondary education is indispensable for knowledge spillover to take place and for attracting imports of technologically advanced goods and foreign direct investment (Borenxztein,

de Gregorio, & Lee, 1998; Caselli & Coleman, 2001; Xu, 2000). Extensive research has been done regarding the completion issue at the primary school level worldwide, but relatively few studies has been done at both the lower and upper secondary school level (World Bank, 2005).

Previous researchers have used some factors from household- or school- level data, but rarely from commune level data. Consequently, existing research results are not likely to be generalizable to the broader context. Therefore, this current study fills a gap in existing research by looking at factors based on international literature and on Vietnamese-specific studies that consider household and commune variables in conjunction with secondary school completion. In addition, a review of the literature suggests that family type, educational achievement, and commune wealth were missing. Notwithstanding the importance of empirical evidence, few scholars have attempted to examine how these three variables influence secondary school completion.

CHAPTER THREE: RESEARCH METHODOLOGY AND METHODS

Data Source

This study aims to identify factors associated with secondary school completion. This study draws on a secondary data analysis of the 2006 Vietnam Living Standards Survey (VLSS). The 2006 VLSS were adjustments of the first two Vietnam Living Standards Surveys (VLSS) that were administered in 1992-93 and 1997-98 by the State Planning Committee (now Ministry of Planning and Investment) with the General Statistics Office (GSO).

From 2002 to 2010, the VLSS has been conducted every two years by the GSO to systematically monitor living standards of the Vietnamese and to assess the implementation of the Comprehensive Poverty Reduction and Growth Strategy. This study uses the 2006 VLSS because it contained extended variables in its education section. In addition, it provides up-dated data on critical transitions experienced by Vietnamese citizens, providing comprehensive information on education, health, income, expenditures, employment, industrial activities, migration, and poverty (General Statistics Office, 2006). The survey is also used to evaluate progress toward the Millennium Development Goals and Vietnam Development Goals (General Statistics Office, 2006). The 2006 VLSS was collected over two rounds, May and September of 2006, through interviewing household heads and key commune officials.

Sample Design

The VLSS of 2006 includes 45,945 households randomly selected from 3,063 districts in 64 provinces. These 45,945 households were divided into two independent samples. Among them, 36,756 households were selected for the income questionnaire only while 9,189 households were chosen for both income and expenditures questionnaire (General Statistics Office, 2006). The 2006 VLSS is comprised of three questionnaires: Household Questionnaire, School Questionnaire, and Commune Questionnaire. For the household questionnaire, 3,010 communes and 3,063 districts were included in the sample (General Statistics Office, 2006); for the commune questionnaire, 2,254 communes and 2,254 districts were included for commune questionnaire (General Statistics Office, 2006). A Sample from the 2006 VLSS survey is shown in Figure 4.

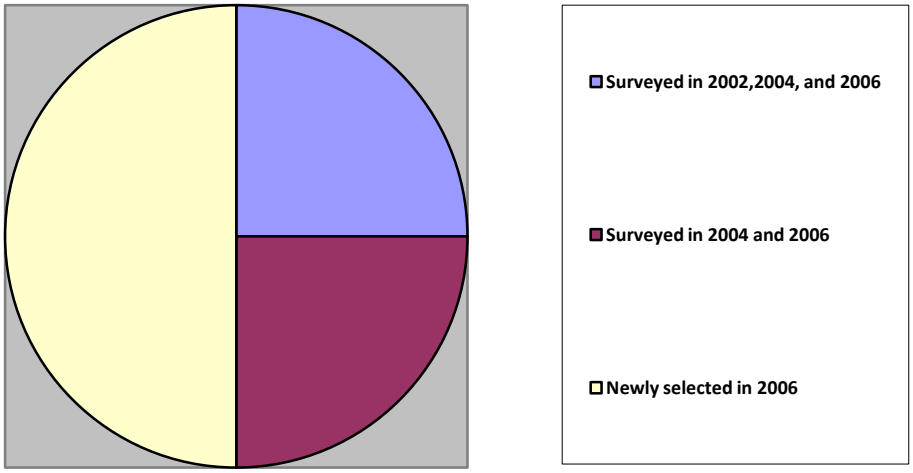

Figure 4. Sample from the 2006 VLSS Survey
Source: General Statistic Office (2006). Result of the Survey on Household Living Standards 2006. Created by the author.

The sample was a three-stage stratified sample, where communes were selected in the first stage and one enumeration area[8] (EA) per commune was selected in the second stage. The communes were stratified by province and by urban/rural location, and the sample was allocated over strata proportional to the square root of the number of households. Both communes and EAs were selected with probability proportionate to size (General Statistics Office, 2006).

Within each selected EA, 20 households were randomly selected at the third stage from which a sub-sample of 15 households was randomly selected. The sub-sample was used for the survey, and the remaining five households were designated as reserve households (to be used as substitutes for non-response households). Among those 15 households, 12 were selected randomly to complete the income questionnaire only while three households were chosen for the income and expenditures questionnaire. There were 1,033 LSS students from 1,008 households in 42 communes in the sample. There were 867 USS students from 824 households in 42 communes in the sample.

Model

Logistic Regression Model

The logistic regression model was utilized in the study since the dependent variable is dichotomous ('0' for non-completion, and '1' for completion). The logistic

[8] A geographic area into which regions or countries are divided for the purpose of taking a census. http://www.websters-online-dictionary.org/definitions/enumeration+area.

regression model predicts students' chances of school completion and takes the following form:

$$y = b_0 + b_1 X_1 + b_2 X_2 + \ldots + b_n X_n$$

where y is the log odds of the dependent variable = ln(odds(event)),

b_0 is the constant, and X_i represents i independent (X_i) variables, including interaction terms.

Using multilevel models would be beneficial to diagnose nested effects of individual within an aggregate unit, here in commune variations on school completion. But due to the small student samples per commune, a multilevel model analysis was not conducted. In this study, 11 potential explanatory variables were selected based on a rigorous literature review: household income, parents' education level, expenditures for schooling, rural or urban residence, family type (no-parent, single-parent, two-parent), gender, ethnicity, academic achievement, commune wealth, distance to school, and wages.

Instrumentation

Secondary school completion is the outcome of interest. In the following section, the 11 predictors are grouped into household, individual, and commune categories with detailed explanations.

Household and Individual Factors

This study included eight independent variables pertaining to five household and three individual factors: household expenditures (proxy for household income), parents' education level, expenditures for schooling, rural or urban residence, family type (single-parent or two-parent), gender, ethnicity, academic achievement of student.

(1) Data on household income are examined by 'household expenditures' since household expenditures is regarded as a more objective measure than household income in existing literature (Glewwe & Jacob, 1998), and because sometimes interviewees do not reveal their income sources clearly.

(2) Parents' education is based on either father's or mother's education, whichever is higher (1 to 12 Grade).

(3) Expenditures for schooling is measured by the expenses indicated by interviewees in the questionnaire.

(4) Rural or urban residence is reported by interviewees ('0' for 'rural' and '1' for 'urban').

(5) Family type is measured by whether a student has single parent (or no-parent) or two-parent ('0' for 'no-parent or single parent' and '1' for 'two-parent').

(6) Sex of a student ('0' for 'female students' and '1' for 'male students').

(7) Ethnicity is re-coded as a dummy ('0' for 'non-Kinh' and '1' for 'Kinh').

(8) Academic achievement is categorized as follows: '1' for 'distinction', '2' for 'good', '3' for 'normal', '4' for 'weak', and '5' for 'no idea'. The values were recoded '1' for 'weak', '2' for 'normal', '3' for 'good', '4' for 'distinction', '9'

for ‘no idea’ and ‘missing data’ to be consistent with the direction of the value; higher scores means higher achievement.

The principal component factor analysis was conducted in order to avoid multicollinearity. According to Leech, N., Barrett, K. C., & Morgan, G. A (2005), a principal component analysis is to help investigators represent a large number of relationships among interval-level variables in a parsimonious way. This analysis allows the computer to determine which set of items, “hang together” as a group. As seen Appendix A and Appendix B, three independent variables have a strong/ moderate relationship: household income, expenditures for schooling, and commune wealth. After running a principal component analysis, a factor score was obtained. This study used the factor score in the prediction model as continuous variable. This study named this factor score as ‘economic status’.

Commune Factors

The 2006 VLSS commune questionnaire collects information on the demographic characteristics of the commune/ward, general economic conditions, schools, infrastructure, transportation, and health (General Statistics Office, 2006). To serve the purpose of this study, three variables are chosen: (1) commune wealth; (2) distance to school; (3) wages.

1. To assess ‘commune wealth’, the average expenditures of three households in a commune was analyzed.

2. To analyze 'distance to school', time to travel (minute) from a school to the center of a commune was examined.
3. To analyze 'wages', daily wages average for child labor in a commune (a proxy for opportunity cost) was analyzed[9].

Analysis

The basic population of analysis in this study is limited to students who have attended a four-year lower secondary school and a three-year upper secondary school. Therefore, the students who failed to graduate from primary school or did not enroll in a four-year lower secondary school were excluded from the analysis. The students who failed to graduate from lower secondary school or who did not enroll in a three-year upper secondary school were also excluded.

To analyze lower secondary school completion, students aged 14 and 15 (who started primary school at the age of 7[10]) were examined. Students whose age was between 17 and 18 (who started primary school at the age of 7) were analyzed for upper secondary school completion. The primary statistical method applied for the analysis of this study is a logistic regression model. The model provides results indicating whether there is a statistically significant difference in school completion by selected independent variables related to household, commune, and independent variables of gender, ethnicity, and academic achievement. The Statistical Package for Social Sciences (SPSS) 19.0 was used for the analysis.

[9] Glewwe and Jacoby (1998) used commune- level wages rates for adult male agricultural labor as proxies for the value of children's time (when data on the value of children's time were not available).
[10] In general, Vietnamese students start grade 1 at the age of 6 however some students start one year later.

Table4

Analytical Procedure of the 2006 VLSS Secondary Data

Research Questions	Sub-Hypotheses	Instrument	Data Analysis
Question 1: To what extent are household variables associated with secondary school completion?	Hypothesis (1): Household expenditures will be positively associated with school completion. Hypothesis (2): Parents' educational level will be positively associated with school completion. Hypothesis (3): The more expenditures for schooling costs, the lower school completion would be. Hypothesis (4): Students in urban areas will be more likely to complete school compared to those in rural areas. Hypothesis (5): Students from two parent' family will be more likely to complete school compared to those from single parent's family (or no-parent's family).		1. Household expenditures (Real per capita expense), 2. Parents' education level, 3. Expenditures for schooling; 4. Rural or urban residence, 5. Family type(single or two-parent)
		Logistic Regression	IV: 5 household variables DV: Secondary school completion
Question 2: To what extent are commune characteristics associated with secondary completion?	Hypothesis (6): Commune wealth will be positively related to school completion. Hypothesis (7): Distance to school will be negatively related to school		1. Average expenditures of household in a commune 2. Time to travel from a school to the center of a commune 3. Daily average wages for child labor in a commune

	completion. Hypothesis (8): The higher the average wages for child labor in a commune, the lower school completion would be.	Logistic Regression	IV: 3 commune variables DV: Secondary school completion
Question 3: To what extent, are gender/ ethnicity related with secondary school completion?	Hypothesis (9): Male students will be more likely to complete the school compared to female students. Hypothesis (10): Kinh students (major ethnic group) will be more likely to complete lower school, compared to non-Kinh students.	Logistic Regression	IV: Gender, Ethnicity DV: School completion
Question 4: To what extent, is academic achievement associated with secondary school completion?	Hypothesis (11): Students of higher education achievement will have higher rates of school completion.	Logistic Regression	IV: Academic achievement of students DV: Secondary school completion

CHAPTER FOUR: RESULTS

To answer four research questions, four types of analyses were conducted: exploratory descriptive analysis, correlations, factor analysis, and logistic regression.

Exploratory Descriptive Analysis

Exploratory descriptive analysis was run on all independent variables to obtain frequencies, means, and distributions. This is a first step in analyzing data sets to check if values are within range on variables and if means and standard deviations are plausible (Tabachnick & Fidell, 2007). Table 5-1 shows mean, standard deviation, and % of valid cases for the lower secondary school (LSS) level.

Table 5-1
Means, Standard Deviations, and % of Valid Cases for Variables Used in the Study for Lower Secondary School (N=1,033)

Variables	M	SD	% of valid cases
Household Characteristics			
Household income (family expenditures by 1,000 VND[11])	27712	27829	100
Parents' education level (0-12)	8.5	3	100
Expenditures for schooling (by 1,000 VND)	2421.4	2999.1	100
Residence ('1' is 'urban')	0.22	0.47	100
Family type ('1' is two-parent family)	0.94	0.24	99.6
Individual Characteristics			
Gender ('1' is 'male student')	0.51	0.5	100
Ethnicity ('1' is 'Kinh')	0.87	0.33	100
Academic achievement (1-4)	2.6	0.69	80.8
Commune Characteristics			
Commune wealth (average expenditure of household by 1,000 VND)	24930.9	15105	100
Distance to school (minutes to travel to school)	18.3	14.1	49.9
Wages (daily average wages for child labor by 1,000 VND)	35.7	9.1	71.7

[11] VND is Vietnamese currency, so called Vietnamese Dong.

There are two important issues to address regarding the exploratory descriptive analysis for LSS students. First, a mean of .22 in the residence variable indicates that students from urban areas consisted of 22 % of the sample, while those from rural areas consisted of 78 % of the sample in this study. This finding is based on the total population ratio in Vietnam where the urban population comprises about 22 % of every 100 residents. 87 % of students were of Kinh ethnicity. As for family type, 94 % of students in this study were from two- parent' families. Almost an equal number of girl and boy students were included in the study.

Second, there was a significant amount of missing data for three independent variables: academic achievement (19.2 %), distance to school (50.1 %), and wages (28.3 %)[12]. In particular, no data for distance to school and wages were available for urban areas as these two variables were only asked in survey of rural residents. The study conducted sensitivity regression analyses that included all 11 independent variables and excluded the three variables for which information was lacking in order to examine how these three variables would affect results of the regression analysis (p. 67).

Table 5-2 shows mean, standard deviation, and % of valid cases for the upper secondary school (USS) level.

There are three important observations regarding the exploratory descriptive analysis for USS students. First, the analysis showed noticeable increase (13.9 %) in expenditures for schooling. The increase might be derived from the fact that relatively higher costs are necessary to support students in USS as compared to LSS.

[12] In disaggregated descriptive analysis ran for LSS rural only, the values become different: academic achievement (27.7%), distance to school (55.7%), and wages (8%) respectively.

Second, the distance to school in the descriptive analysis of USS is almost double that of LSS. The increased distance may be based on the fact that there are fewer upper secondary schools available to students compared to lower secondary schools (General Statistics Office, 2004).

Table 5-2
Means, Standard Deviations, and % of Valid Cases for Variables Used in the Study for Upper Secondary School (N=867)

Variables	M	SD	% of valid cases
Household Characteristics			
Household income (family expenditure by 1,000 VND)	29348	17364	100
Parents' education level (0-12)	8.45	2.95	100
Expenditures for schooling (1,000 VND)	2812	3297	100
Residence ('1' is 'urban')	0.23	0.42	100
Family type ('1' is two-parent family)	0.89	0.31	99.8
Individual Characteristics			
Gender ('1' is 'male student')	0.51	0.5	100
Ethnicity ('1' is 'Kinh')	0.87	0.34	100
Academic achievement (1-4)	2.51	0.64	49.7
Commune Characteristics			
Commune wealth (average expenditure of household by 1,000 VND)	25969	14715	100
Distance to school (minutes to travel to school)	30.97	22.54	45.7
Wages (daily average wages for child labor by 1,000 VND)	36.01	9.45	47.3

Third, similar to the data for LSS analyses, there is a significant amount of missing data for three independent variables in USS data: academic achievement (50.3 %), distance to school (54.3 %), and wages (52.7 %)[13]. No data for distance to school and wages were available for urban areas as these two variables were only asked in survey of rural residents. As mentioned earlier, in the current study sensitivity regression analyses

[13] In disaggregated descriptive analysis ran for USS rural only, the values become different: academic achievement (51.7%), distance to school (40.5%), and wages (38.4%) respectively.

were conducted to include all 11 independent variables and then to exclude three key variables in order to examine how these three variables would affect results of the regression analysis.

To illustrate disparity in groups, Figure 5-1 and Figure 5-2 indicate the mean difference of school completion rate with four dichotomous independent variables at LSS and USS level respectively: ethnicity, gender, family type, and residence.

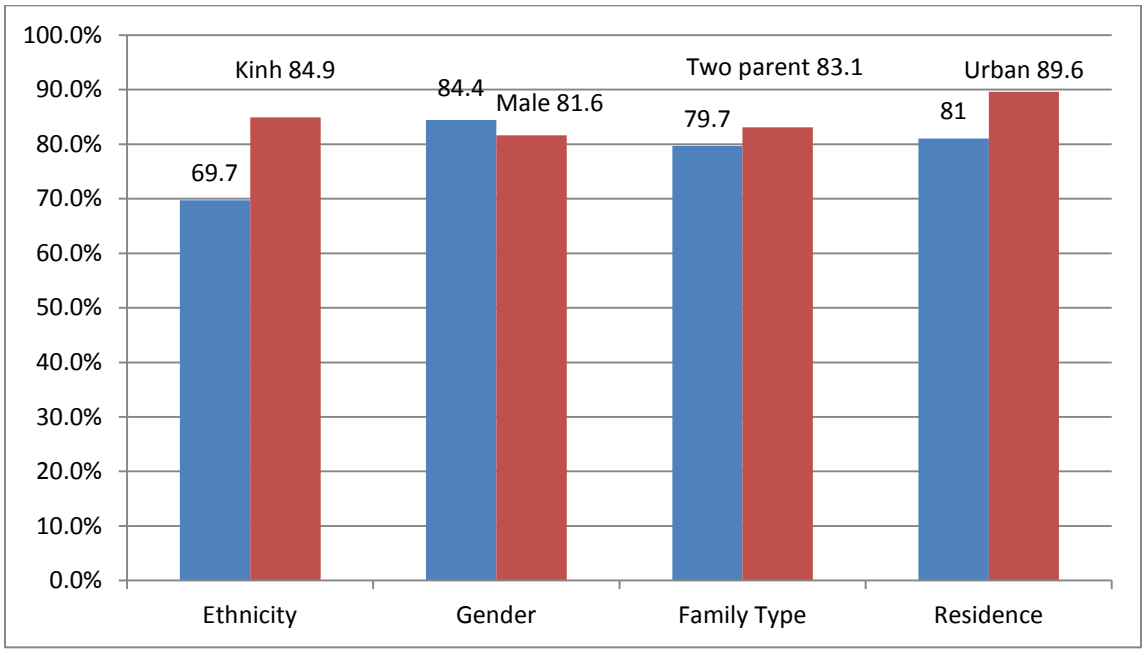

Figure 5-1. Profile for Lower Secondary School Completion Rates

Consistent with the existing literature, students from the major ethnic group, two-parent' families, and urban areas have higher school completion rates at both the LSS and USS level. The gap between in school completion rates for each variable widens as the school level goes up. For example, regarding ethnicity, school completion difference increases from 15.2 % at LSS to 18.1 % at USS. For residence, it increases from 8.6 % at LSS to 15.4 % at USS.

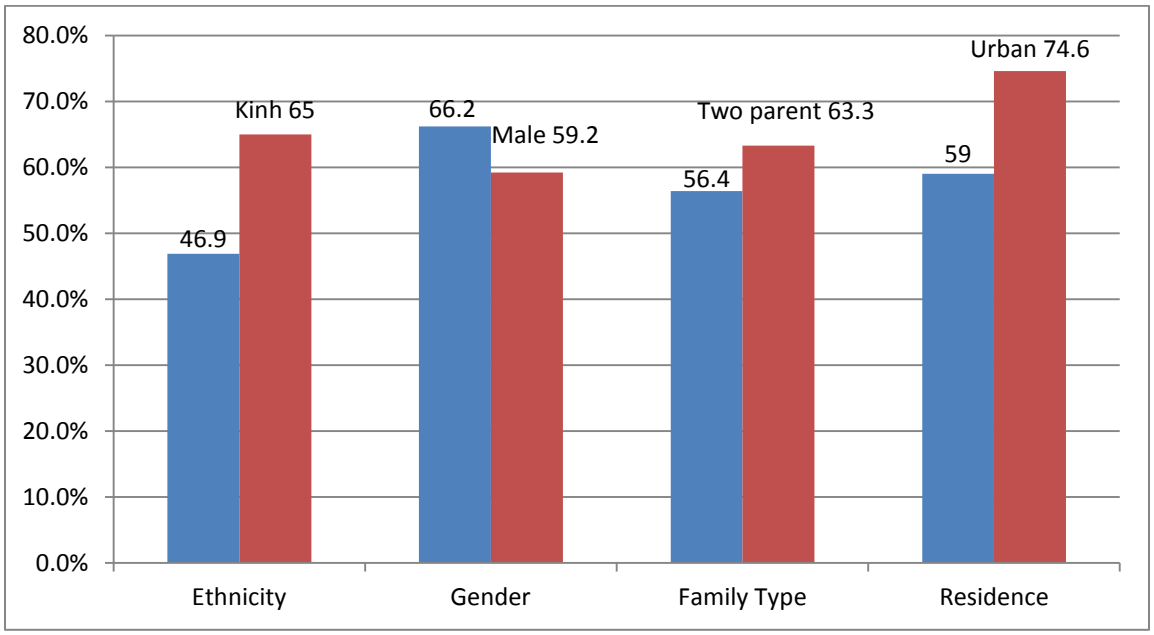

Figure 5-2. Profile for Upper Secondary School Completion Rates

Interestingly, female students are more likely to complete school than male students by 2.8 % at LSS and by 7 % at USS, respectively. There seems to be two possible explanations for this result. One explanation could be relatively higher academic performance by female students than male students. Rolleston et al. (2013) indicate that Vietnamese girl students in Grade 5 achieved higher academic performance than boy students in the *Young Lives*[14] report. Results from the Program for International Student Assessment 2012 also showed that Vietnamese girls perform better than boys with a statistically significant difference (OECD, 2012).

Another explanation for the higher school completion rates for female than that of male students is due to the higher enrollment rate of male students in vocational school.

[14] *Young Lives* is a long-term study of childhood poverty following the lives of 12,000 children in Ethiopia, India (in the state of Andhra Pradesh), Peru, and Vietnam over 15 years. Young Lives is a collaborative partnership between research and government institutes in the four study countries, led by a team at the University of Oxford.

According to Rodgers and Menon (2010), 1.5 % male students aged 15 and 17 are enrolled in vocational school in comparison to 0.9 % of female students, therefore influencing the relatively lower completion rate of male students, compared to that of female students in general secondary school.

Correlation Analyses

Pearson correlations were calculated to measure the linear correlation between two continuous variables, and point-biserial correlation was calculated to measure correlation between one dichotomous and one continuous variable. Since the point-biserial correlation is simply the special case of the Pearson product- moment correlation applied to a dichotomous and a continuous variable, the coefficients produced by Pearson correlations are point-biserial correlations when these types of variables are involved (IBM SPSS website, 2014). The values in Pearson correlations range from 1 to -1, where 1 indicates total positive correlation, 0 indicates no correlation, and -1 indicates total negative correlation. In addition, Cramer's V was calculated to examine relationships between ordinal (and dichotomous) and dichotomous variables as a sensitivity analysis. The values in Cramer's V ranging from .25 or higher are regarded as very strong relationship, while the values below this range are considered moderate or weak[15]. Table 6-1 and Table 6-2 demonstrate correlations for LSS and USS, respectively.

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[15] If Cramer's V = .25 or higher very strong relationship, .15 to .25 = strong relationship, .11 to .15 = moderate relationship , .06 to .1 = weak relationship, .01 to .05 = no or negligible relationship http://faculty.quinnipiac.edu/libarts/polsci/statistics.html

Table 6-1

Correlations between Independent Variables and Dependent Variable for Lower Secondary School Completion

Variable / LSS Completion	Expenditures for schooling	Distance to school	Household income	Commune wealth	Wages	Parents' education level	Academic achievement	Ethnicity	Residence	Family Type	Gender
Pearson	.28**	-.16**	.12**	.08*	-.004	n.a	n.a	n.a	n.a	n.a	n.a
Cramer's V	n.a	n.a	n.a	n.a	n.a	.43**	.42**	.14**	.1**	.02*	-.04

Note. **p<.01, *p<.05

Table 6-2

Correlations between Independent Variables and Dependent Variable for Upper Secondary School Completion

Variable / USS Completion	Expenditures for schooling	Household income	Distance to school	Commune wealth	Wages	Parents' education level	Academic achievement	Residence	Ethnicity	Gender	Family Type
Pearson	.41**	.18**	-.18**	.13**	.11*	n.a	n.a	n.a	n.a	n.a	n.a
Cramer's V	n.a	n.a	n.a	n.a	n.a	.35**	.25**	.14**	.13**	-.07	.04

Note. **p<.01, *p<.05

Table 6-1 shows two bivariate correlations, Pearson and Cramer's V correlations, between 11 independent variables and LSS completion. In Pearson correlations, three out of five variables have statistically significant correlations with LSS school completion at $p <. 01$, and one variable has a statistically significant correlations at $p <.05$. Among four variables, expenditures for schooling have the strongest correlations at .28, showing a statistically positive weak relationship. Distance to school comes in second with a correlation at -.16, and household income follows at .12.

In Cramer's V, four out of six variables have statistically significant correlations with LSS completion at $p <.01$ and one variable at $p <.05$. Among five variables, parents' education level has the strongest correlation at .43, indicating a very strong positive relationship between parents' education level and LSS completion. Academic achievement comes in second at .42, and ethnicity follows at .14.

Table 6-2 shows Pearson and Cramer's V correlations and displays the relationships between 11 independent variables and USS completion. Pearson correlations indicate that all five variables have a statistically significant correlation with USS completion. Four out of five variables have a statistically significant correlation with USS completion at $p <.01$ and one variable has a statistically significant correlation at $p <.05$. Expenditures for schooling have the strongest correlation at .41, showing a statistically positive strong relationship, followed by household income at .18 and by distance to school at -.18. Cramer's V correlations demonstrate that four out of six variables have a statistically significant correlation with USS completion at $p <.01$ level. Among four variables, parents' education level has the strongest correlations at .35,

indicating a very strong positive relationship based on Cramer's V, followed by academic achievement at .25.

Multicollinearity Analysis

As seen in Appendix A and Appendix B, examination of Pearson correlations for LSS and USS was conducted to diagnose any multicollinearity among independent variables. According to Central Michigan University (2014), multicollinearity is the undesirable situation where there are strong correlations among the independent variables. It further notes;

"Multicollinearity misleadingly inflates the standard errors. Thus, it makes some variables statistically insignificant while they should be otherwise significant."

There was strong and moderate positive correlation among three independent variables shown in Appendix A for LSS (.49, .81, .45) and Appendix B for USS (.42, .66, .28): household income, expenditures for schooling, and commune wealth. To minimize multicollinearity, these three variables were analyzed with principal component factor analysis and factor score were used in all 12 regression models as an independent variable. Table 7-1 and Table 7-2 show the factor loadings of the three independent variables for the LSS and USS level.

Table 7-1
Principal Component Factor Analysis for Lower Secondary School

	National level	Rural	Urban
	Component	Component	Component
	1	1	1
Household income	.918	.917	.925
Commune wealth	.902	.838	.919
Expenditures for schooling	.724	.666	.739

Table 7-2
Principal Component Factor Analysis for Upper Secondary School

	National level	Rural	Urban
	Component	Component	Component
	1	1	1
Household income	.894	.908	.875
Commune wealth	.836	.865	.755
Expenditures for schooling	.656	.572	.685

This new composite variable, "economic status", was created to represent the economic wealth of those in the sample. Household income has the largest loading while expenditures for schooling has the smallest for all factor analyses.

Logistic Regression Analysis

Logistic regression is a type of regression analysis when the dependent variable is dichotomous. It allows the prediction of a dichotomous outcome from a set of predictors. The predictor variables can be any mix of continuous, categorical, and dichotomous variables (Knoke, D., Bohrnstedt, G. W., & Mee, A. P., 2002). In this study the following two key statistical concepts, odds ratios and pseudo-R^2, are explained to facilitate interpretation of the logistic regression models, and 12 regression models that were run are discussed to answer the key research questions.

Odds Ratios

The odds ratio, also known as Exp (B), is the increase or decrease in the odds of dependent variable when the value of the independent variables increases by one unit

(Leech et al., 2005). For example, an odds ratios of 1.5 indicates that one unit of independent variable is associated with a 50% increase of the dependent variable.

Pseudo-R^2 Measure

It is a descriptive measure for logistic regression that indicates roughly the proportion of variation in the dependent variable accounted for by the predictors (Knoke et al., 2002). Logistic regression does not have an equivalent to the R^2 measure that is found in ordinary least square regression; therefore, it is necessary to interpret this statistic with great caution (Allison, 2013). The reason it is referred to as Pseudo-R^2 measure is because it does not represent the proportionate reduction in error as the R^2 in linear regression does (Cohen & et al., 2003).

Cohen et al. (2003) further demonstrates that linear regression assumes homoscedasticity in that the error variance is the same for all values of the criterion while logistic regression has heteroscedastic – the error variances differ for each value of the predicted score. Therefore, it is inappropriate to regard R^2 as a proportionate reduction in error in a universal sense in logistic regression.

Among a variety of pseudo-R-square statistics, SPSS reports the Cox & Snell measures and Nagelkerke measures (corrected version of Cox & Snell which will be discussed below) for binary logistic regression.

The Cox and Snell R^2 is $R^2_{C\&S} = 1 - (L_0 / L_M)^{2/n}$

Where L_0 is the value of the likelihood function for a model with no predictors, L_M is the likelihood for the model with predictors, and n is the sample size (Allison, 2013). Cox & Snell R^2 indicates roughly the proportion of variation in the dependent variable accounted for by independent variables. For example, if Cox & Snell R^2 is .24, the interpretation is 24 percent of the variance in the dependent variable is associated with independent variables.

However, it is important to note that the Cox-Snell's Pseudo-R^2 has a maximum value that is not 1.0. Specifically, the upper bound [16] is $1 - L_0^{2/n}$. Nagelkerke measures adjusts Cox-Snell's so that the range of maximum possible values extends to 1 (Allison, 2013; UCLA, 2013). To achieve this, the Cox and Snell R^2 is divided by its maximum possible value, $1 - L_0^{2/n}$. If the full model perfectly predicts the outcome and has a likelihood of 1, Nagelkerke $R^2 = 1$ (UCLA, 2013). Therefore, the value of Nagelkerke is normally higher than Cox & Snell. As the maximum R^2 declines, the difference between R^2 in Cox & Snell and Nagelkerke becomes larger.

12 Regression Models

The objective of the analyses was to determine what independent variables were associated with secondary school completion in Vietnam. To conduct disaggregated analyses by residence, this study created three data sets for both LSS and USS: national, rural only, and urban only. Thus, there are six data sets total. This allowed the researcher

[16] The maximum value (the upper bound) can be a lot less than 1.0, and it depends only on p, the marginal proportion of cases with events: upper bound = $1 - [p^p(1-p)^{(1-p)}]^2$
This has a maximum of .75 when p=.5. By contrast, when p=.9 (or .1), the upper bound is only .48.

to identify the relationship between independent variables and both LSS and USS completion for those in different residences.

As seen in Table 8, there were 12 logistic regression models developed in the analysis of factors influencing students' school completion. As discussed in the exploratory descriptive analysis (pp.55-57), a significant amount of data was missing for three independent variables: academic achievement, distance to school, and wages. The study therefore conducted a sensitivity regression analysis to include all 11 independent variables[17] and to exclude these three variables in order to examine how these three variables would affect results of the regression analysis (regression run with "fewer variables"). In addition, two variables, distance to school and wages, were only used in the rural data set for the LSS and USS analyses because the data for these two variables were not available in urban areas.[18]

Table 8
Types of Regression Models

School level / Model	Lower secondary school	Upper secondary school
National level	Model 1	Model 7
National level with fewer variables	Model 2	Model 8
Rural only	Model 3	Model 9
Rural only with fewer variables	Model 4	Model 10
Urban only	Model 5	Model 11
Urban only with fewer variables	Model 6	Model 12

Model 1 shows LSS completion at the national level which included both rural and urban students. In Model 1, distance to school and wages variables were excluded

[17] The 11 independent variables were reduced to nine variables due to the use of a composite variable, economic status.
[18] Two variables, distance to school and wages, were only asked in the survey of rural residents.

because data for these two variables were only available for rural areas. Model 2 shows LSS completion at the national level with fewer variables. Academic achievement was removed due to its significant missing data (19.2 %).

Model 3 shows LSS completion for rural only. All original variables, except residence, were included. Model 4 shows LSS completion for rural only with fewer variables. Academic achievement, distance to school, and wages variables were excluded because of significant missing data (27.7 %, 56 %, 8 %, respectively).

Model 5 shows LSS completion for urban only. In Model 5, distance to school and wages variables were excluded as data for these two variables were only available for rural areas. Model 6 shows LSS completion for urban only with fewer variables. Academic achievement was removed due to its missing data (8.6 %).

Model 7 shows USS completion at the national level which included both rural and urban students. In Model 7, distance to school and wages variables were excluded as data for these two variables were only available for rural areas. Model 8 shows USS completion at the national level with fewer variables. Academic achievement was removed due to its significant missing data (50.3 %).

Model 9 shows USS completion for rural only. All original variables, except residence, were included. Model 10 shows USS completion for rural only with fewer variables. Academic achievement, distance to school, and wages variables were excluded as they have significant missing data (51.7 %, 40.5 %, and 38.4 %, respectively).

Model 11 shows USS completion for urban only. In Model 11, distance to school and wages variables were excluded as data for these two variables were only available for

rural areas. Model 12 shows USS completion for urban only with fewer variables. Academic achievement was removed due to its significant missing data (84.4 %).

To sum up, 12 regression models were created for two reasons. First, data for two independent variables, distance to school and wages, were only available for rural locations. Second, there was a significant amount of missing data for three independent variables in data: academic achievement, distance to school, and wages. Therefore, in the current study sensitivity regression analyses were to include all nine independent variables and exclude these three variables to examine how these three variables would affect results of the regression analysis (regression ran with 'fewer variables').

Table 9 represents the master table and shows the logistic regression coefficient, standard error, and two Pseudo-R^2 measures (Cox & Snell and Nagelkerke) for all six regression models for LSS completion. The master table of all six regression models for USS completion follows on page 84.

Academic achievement was found to be statistically significant in Model 1 (national level) and Model 3 (rural only) at $p<.01$. None of the independent variables was statistically associated with students' school completion in Model 5 (urban only).

As mentioned earlier, 12 sensitivity analyses for both LSS and USS were conducted with regression models that included all independent variables and with reduced models that excluded variables with any missing values in order to see influence of missing data on the inference from the regression model. The reduced models (with fewer variables) demonstrated two notable findings.

Table 9
Logistic Regression Coefficient and Standard Error for LSS Completion

Variable Effect	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Economic status	0.61	1.02***	0.34	.52***	1.38	1.15**
	(.52)	(.22)	(.47)	(.14)	(1.33)	(.45)
Parents' education	0.08	.36***	0.11	.4***	-0.003	.22**
level	(.09)	(.03)	(.13)	(.04)	(.18)	(.08)
Residence	-0.61	-0.37				
	(.64)	(.29)				
Family type	-0.22	-0.63	-17.41	-1.13*	1.21	0.87
	(1.07)	(.4)	(7577.45)	(.49)	(1.29)	(.67)
Academic	1.14*		2.53*		0.03	
achievement	(.56)		(1.18)		(.77)	
Gender	-0.001	-0.29	0.24	-0.24	0.96	-0.67
	(.5)	(.19)	(.71)	(.21)	(1.23)	(.51)
Ethnicity	0.1	0.12	0.003	0.05	1.22	0.99
	(.67)	(.25)	(1.22)	(.27)	(1.32)	(.71)
Distance to school			0.008			
			(.033)			
Wages			-0.09			
			(.04)			
Cox & Snell R^2(%)	1.3	18.1	3.5	18.9	2.4	13.6
Nagelkerke R^2 (%)	7.2	30.2	18	30.4	13.8	27.7
Constant	0.86	-0.19	17.66	-0.17	1.72	-1.35
	(1.74)	(.48)	(7577.45)	(.55)	(2.78)	(.96)
-2 Log Likelihood	154.92	736.38	71.85	610.83	34.37	120.19
Number of cases	833	1029	399	801	204	228

Coefficient is the estimated logit coefficient. It is a value for the logistic regression equation for predicting the dependent variable from the independent variable. It is in log-odds units.
SE is the standard error.
* indicates p <.05, ** indicates p <.01, *** indicates p <.001.

First, both economic status and parents' education level were statistically significant as shown in Model 2 (LSS national level with fewer variables), Model 4 (LSS rural only with fewer variables), and Model 6 (LSS urban only with fewer variables). The three models showed parents' education level and economic status to be statistically

significant, regardless of residence when academic achievement was removed from the model.

Second, there was a noticeable increase in Cox & Snell R^2 and Nagelkerke R^2 after dropping academic achievement, distance to school, and wages. The Cox & Snell R^2 and Nagelkerke R^2 in Model 3 (rural only) were 3.5 % and 18 %, whereas they were 18.9 % and 30.4 % in Model 4 (rural only with fewer variables). This change is due to either the different number of independent variables included in regression models or impact of independent variables on a dependent variable. Because independent variables control for the effect of the other independent variables on dependent variable, value of coefficients and explanation power would differ in regression models based on the number of independent variables included or which independent variables included.

Another major finding of the LSS regression analyses indicated that ascriptive factors,[19] including gender, residence, and ethnicity were not statistically associated with school completion, except economic status.

Interestingly, family type was statistically associated with LSS completion in Model 4 (LSS rural only with fewer variables). Students with no parents or from single-parent families were more likely to complete LSS. This finding is inconsistent with most existing literature which shows that students from two-parent families are more likely to complete school. The exact reason for this anomaly remains unanswered.

[19] Levy's modernization theory (1996) argues that the influence of ascriptive factors is powerful in every aspect of education in developing countries. Ascriptive factors in an education context refer to any educational disadvantages reflected in ethnicity, gender, and social class, but not to disadvantages based on ability or merit.

In the next section, the problem of missing data will be discussed, as this study used 2006 VLSS data, and this data included a significant amount of missing values. Then, three LSS models are demonstrated. First, Model 1 (LSS national level) and Model 2 (LSS national level with fewer variables) are compared in order to explain how models with a missing variable differ from models with complete variables. Second, two important regression models with most explanatory power, Model 2 and Model 8 (USS national level with fewer variables) that most fully answer this study's research questions, are discussed. Third, Model 3 (LSS rural only) and Model 9 (USS rural only) explain the statistical association between commune variables and secondary school completion in order to answer Research Question 2.

The Problem of Missing Data

As is typical in large scale social surveys, there exists a substantial amount of missing data in the 2006 VLSS utilized by the current study. Although each individual variable may have a relatively small percent of missing data, when examined in combination in the analyses, the missing percentage drastically reduces the number of valid cases and results in a loss of statistical power. (SPSS white paper, n.d.). This is clearly the case in this study, shown in both Model 3 (LSS for rural only) and Model 9 (USS for rural only). Simply removing the samples with missing cases from the analysis results in a loss of up to 71 % of the sample,[20] raising concerns about the external validity of the results.

[20] 50.2 % in Model 3(LSS rural only) and 71 % in Model 9 (USS for rural only).

There are three types of missing data mechanisms: missing completely at random (MCAR), missing at random (MAR), and not missing at random (NMAR). A variable is MCAR if the probability of being missing is independent of any characteristics of the subjects (He, 2010). He (2010) further states that it is possible to test whether data are MCAR.

If missingness is determined to be either MAR or MCAR, the results from regression findings in models are likely to be unbiased. That is, missingness of data does not have a pattern. A remaining disadvantage of large amounts of missing data in variables is, however, that the results of the analysis may not be statistically significant because of the loss of sample.

If meaningful differences exist between those with and without missing data for some variables, it is regarded as NMAR. When missing data are NMAR and demonstrate a systematic pattern, the results from regression findings in models are biased. To differentiate the missing data as MCAR, MAR, and NMAR, and to assess their impact on the meaning of this study's findings, three additional regression models were tested as a kind of sensitivity analysis to assess the impact of excluding missing data on regression models: Model 2 (national level with fewer variables), Model 4 (rural only with fewer variables), and Model 6 (urban only with fewer variables). The current study will discuss this issue with model examples (pp.75-79).

Model 1 and Model 2

To explain how models with a missing variable differ from models with complete variables, Model 1 (LSS national level) and Model 2 (LSS national level with fewer variables) are compared.

Table 10
Model 1: Logistic Regression Results for LSS Completion at the National Level (N= 833, 80.4%).

						95% C.I.for EXP(B)	
		B	S.E.	Sig.	Exp(B)	Lower	Upper
Step 1a	Parents' education level	.075	.087	.388	1.078	.909	1.28
	Residence	-.613	.644	.341	.542	.153	1.915
	Family type	-.224	1.072	.834	.799	.098	6.532
	Gender	-.001	.499	.998	.999	.375	2.659
	Ethnicity	.095	.673	.888	1.099	.294	4.112
	Academic achievement	1.144	.556	.039	3.139	1.057	9.325
	Economic status	.61	.522	.242	1.841	.662	5.12
	Constant	.855	1.744	.624	2.352		

Model 1 in Table 10 shows the logistic regression results for LSS completion at the national level. Academic achievement was the only independent variable associated with LSS completion at the national level.[21] Its value of 3.14 indicates that a movement in academic achievement to the next higher level,[22] holding other covariates constant, is associated with an over threefold increase in the odds of LSS completion. Table 11 shows

[21] In Model 1, the distance to school and wages variables were removed as they have a constant value for students in urban areas (all data were unavailable).
[22] Academic achievement was coded as '1' = 'weak', '2' = 'normal', '3' = 'good', and '4' = 'distinction'.

that only 1.3 % (Cox & Snell) and 7.2 % (Nagelkerke) of the variance in LSS completion can be explained by independent variables in Model 1.

Table 11
Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	154.922	.013	.072

Next, Model 2 was created in response to the findings of removing the academic achievement variable in Model 1.

Table 12
Model 2: Logistic Regression Results for LSS Completion at the National Level with Fewer Variables (N= 1029, 99.6%).

						95% C.I.for EXP(B)	
		B	S.E.	Sig.	Exp(B)	Lower	Upper
Step 1a	Parents' education level	.358	.034	.000	1.431	1.338	1.531
	Residence	-.368	.286	.199	.692	.395	1.213
	Family type	-.626	.398	.116	.535	.245	1.166
	Gender	-.288	.189	.127	.75	.518	1.086
	Ethnicity	.122	.253	.629	1.13	.689	1.854
	Economic status	1.018	.215	.000	2.768	1.816	4.218
	Constant	-.188	.479	.695	.829		

In Model 2, two out of six independent variables were statistically significant at $p<.001$. The results may be interpreted as follows: both economic status and parents' education level are positively related to students' academic achievement. When all three

variables were included in Model 1, economic status and parents' education level variables were not statistically significant with school completion. However, when academic achievement was removed, economic status and parents' education level were found to be statistically significant as expected, given the correlations among these three variables. This is an example of "specification error" in regression models.

According to Berry (1993), specification error refers to mistakes in the way variables are incorporated into a regression model. Berry further explains that it occurs when a regression equation is estimated with the "wrong" independent variables: relevant variables are excluded, irrelevant variables are included, or both (1993). In addition, Freund et al. (2000) demonstrate that specification error is defined as the result of an incorrectly specified model and often results in biased estimates of parameters. Therefore, if a variable is excluded from a model that in fact has a relationship with the outcome variable, it introduces bias in regression coefficients.

For example, suppose, it was hypothesized that success was a function of work ethic and people's innate ability such as Intelligence Quotient (IQ). If in a regression model, work ethic was left out, the coefficient for IQ would dramatically increase. Similarly, when academic achievement was removed from regression models, it resulted in inflated significance of two independent variables, economic status and parents' education level. Thus, whenever critical variables, such as school related factors, which existing literature identifies as important, are left out of a model, then the possibility of specification error is introduced.

Table 13
Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	736.384	.181	.302

Model 2 in Table 13 offers a better explanation of the variance in the dependent variable with explanatory power increased by 16.8 % (Cox & Snell) and by 23 % (Nagelkerke) compared to Model 1 (national level with all variables). As mentioned earlier, the reason for the gap in two Pseudo-R^2measures is because the maximum value of Cox &Snell's Pseudo-R^2 is not1.0 while Nagelkerke's Pseudo-R^2 adjusts Cox-Snell's so that the range of maximum possible values extends to 1.0. Thus, Nagelkerke's Pseudo-R^2 is more comparable to the conventional R^2.

By removing academic achievement, the explanatory power of Model 2 increased, and two other independent variables were found to be statistically significant. To examine the reason for this difference, it was tested whether the data set with the missing variable of academic achievement (n=198) differed substantially from that with the complete variable set (n=833) in terms of descriptive statistics of dependent and independent variables.

As shown in Table 14-1 and 14-2, LSS completion rate was significantly different between the two groups. Those in the survey without data on academic achievement were far less likely to complete LSS. According to the two tables, only 20 % of a group with the missing variable of academic achievement completed LSS, while 98 % of a group with the complete variable set completed LSS. The comparison shows a substantial

difference in the mean of LSS completion rates. The standard deviation of a group with the missing variable of academic achievement is more widely dispersed than that of a group with the complete variables set (.4 and .14, respectively).

Table 14-1
Statistics for LSS National with the Missing Variable of Academic Achievement

		Economic status	Parents' education level	Residence	Family type	Gender	Ethnicity	LSS completion
N	Valid	198	198	198	198	198	198	198
	Missing	0	0	0	0	0	0	0
Mean		-0.39	5.89	.12	.92	.58	.8	.2
SD		0.502	2.731	.327	.273	.495	.399	.399
Skewness		1.926	-.133	2.339	-3.1	-.309	-1.536	1.536

Table 14-2
Statistics for LSS National with a Complete Variable Set

		Economic status	Parents' education level	Residence	Family type	Gender	Ethnicity	LSS completion
N	Valid	835	835	835	831	835	835	835
	Missing	0	0	0	4	0	0	0
Mean		0.092	9.14	.25	.94	.49	.89	.98
SD		1.065	2.718	.432	.233	.5	.315	.141
Skewness		6.823	-.87	1.17	-3.798	.026	-2.475	-6.805

Furthermore, Table 14-1 and 14-2 show that a group with missing variable of academic achievement has lower parents' education level, more rural students, more male students, and more non-Kinh students, compared to those in a group with complete variables. In particular, the tables show a considerable gap in parents' education level (5.89 compared to 9.14) and LSS completion rate (.2 compared to .98), which indicate major differences between the two groups.

A significant amount of missing data of a group with the missing variable of academic achievement suggest that it is very likely that there may be no achievement data available for students who dropped out of school. As a matter of fact, the question asked in VLSS was "what is your academic record in 2005-2006?" Accordingly, responses for students who dropped out of school were coded as "no idea" or "missing". This coding then contributed to the missing data's designation as, biased sample.

Ultimately, it seems reasonable to conclude that missing data in academic achievement are not randomly missing; therefore, Model 2 is a regression one including a larger number of subject with much more statistical power and excluding the variable with missing data problems.

Important Regression Models with the Most Explanatory Power: Model 2 and Model 8

Model 2 (LSS national level with fewer variables) and Model 8 (USS national level with fewer variables) are considered important regression models for three reasons. First, the two models directly answer two research questions: (1) To what extent are household variables associated with secondary school completion? and (3) To what extent are gender and ethnicity related to secondary school completion? Two other research questions are related to commune variables (Research Question 2) and academic achievement (Research Question 4). Regarding commune variables, data were only available for the rural data set; thus the 2nd research question was not answered by Model 2 and Model 8. However, Model 3 (LSS rural only) and Model 9 (USS rural only) are discussed in relationship to this research question (pp.81-83). Since academic

achievement was not randomly missing, Model 2 and Model 8 were run without this variable to avoid any biased statistical results.

Second, Model 2 can be a representative of the LSS regression models in that it indicates similar relationships between the independent variables and the dependent variable as shown in Model 4 (rural only with fewer variables) and Model 6 (urban only with fewer variables). In all these three models parents' education level and economic status were found to be statistically significant, regardless of residence, when academic achievement was removed from the models. As mentioned earlier, the reason for disaggregating data by residence was to identify the relationships between independent variables and school completion according to different residences. But from looking at the results of disaggregated data sets in Table 9, it is very likely that characteristics of aggregated data set at the national level may represent both those of rural and urban areas.

Third, the sample size for Model 2 is the largest among the six LSS models. It is well known that the bigger sample size, the higher the statistical power of the research results (n=1,029).

These three reasons also apply to Model 8 (USS national level with fewer variables). First, Model 8 directly answers two research questions: (1) To what extent are household variables associated with upper secondary school completion? and (3) To what extent are gender and ethnicity related to upper secondary school completion? Regarding commune variables, data were only available for the rural data set; thus the 2nd research question was not answered by Model 8. However, Model 9 (USS rural only) is discussed

in relationship to this research question (p.83). Since academic achievement was not randomly missing, Model 8, which was run without this variable, avoids any biased statistical results.

Second, as in the case of Model 2, Model 8 can be a representative of Model 10 (USS rural only with fewer variables) and Model 12 (USS urban only with fewer variables), showing parents' education level and economic status to be statistically significant.

Third, the sample size for Model 8 is the largest among the six USS regression models which would increase statistical power of the research results.

One of the key research questions in this study asked " to what extent are commune variables associated with secondary school completion?" To answer this question, Model 3 (LSS rural only) and Model 9 (USS rural only) were tested.

Model 3 and Model 9

Model 3 shows the logistic regression results for LSS completion for rural only. Two variables of wages for child labor and distance to school were included because data for these two variables were available only in the rural areas. Wages for child labor, one of the two commune variables, was found to have a significant association with LSS completion at $p<.056$. A value of .92 indicates that a one thousand Vietnamese Dong increase in wages is associated with an 8 % decrease in the odds of LSS completion.

Table 15
Model 3: Logistic Regression Results for LSS Completion for Rural Only (N= 399, 49.8%)

						95% C.I.for EXP(B)	
		B	S.E.	Sig.	Exp(B)	Lower	Upper
Step 1a	Parents' education level	.105	.134	.433	1.110	.855	1.443
	Family type	-17.406	7577.453	.998	.000	.000	.
	Gender	.236	0.714	.741	1.266	.312	5.136
	Ethnicity	.003	1.219	.998	1.003	.092	10.924
	Academic achievement	2.534	1.184	.032	12.605	1.239	128.238
	Distance to school	.008	0.033	.813	1.008	.945	1.075
	Wages	-.085	0.044	.056	.919	.842	1.002
	Economic status	.336	.468	.473	1.400	.559	3.504
	Constant	17.658	7577.454	.998	46663205		

Distance to school, however, was not statistically associated with LSS completion. This result may be due to the fact that since 1990s the Vietnamese government has built many more lower secondary schools to make schooling more accessible for students in rural areas.

Model 9 shows the logistic regression results for USS completion for rural only. In this model, two variables of distance to school and wages were included because data for these two variables were available for rural areas. None of the two commune variables had statistically significant association with USS completion.

Table 16
Model 9: Logistic Regression Results for USS Completion for Rural only (N=193, 29%)

						95% C.I.for EXP(B)	
		B	S.E.	Sig.	Exp(B)	Lower	Upper
Step 1a	Parent education level	.266	0.160	.097	1.305	.953	1.786
	Family type	-19.181	8876.469	.998	0.000	.000	.
	Gender	.399	0.717	.578	1.490	.366	6.069
	Ethnicity	-19.223	9383.889	.998	0.000	.000	.
	Academic achievement	2.226	1.074	.038	9.259	1.129	75.917
	Distance to school	-.018	0.022	.397	0.982	.941	1.024
	Wages	.018	0.045	.699	1.018	.931	1.112
	Economic status	.071	0.401	.859	1.074	.489	2.356
	Constant	33.539	12917.008	.998	3681x1011		

Unlike Model 3, wages for child labor was not statistically significant in Model 9. One possible reason for this result is the small difference in child labor wages. Based on the descriptive statistics, the mean of daily average wages for LSS rural only was 35.7, while that of USS rural only was 36. Therefore, there was little variance related to this factor.

In this section, the logistic regression analyses for USS completion are discussed. Table 17 is the master table, showing the logistic regression coefficient, standard error, and two Pseudo-R^2 measures (Cox & Snell and Nagelkerke) of all six regression models for USS completion.

Table 17
Logistic Regression Coefficients and Standard Error for USS Completion

Variable Effect	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
Economic status	0.31	.63***	0.07	.52***	0.82	.49*
	(.25)	(.11)	(.4)	(.1)	(.8)	(.23)
Parents' education	0.13	.24***	0.27	.21***	0.1	.32***
level	(.07)	(.03)	(.16)	(.03)	(.15)	(.07)
Residence	-0.013	0.02				
	(.52)	(.21)				
Family type	-0.38	-0.13	-19.18	-0.29	1.92	0.6
	(.69)	(.25)	(8876.47)	(.28)	(1.06)	(.59)
Academic	1.25**		2.23*		0.46	
achievement	(.41)		(1.07)		(.69)	
Gender	0.21	-0.22	0.4	-0.14	0.32	-0.72
	(.38)	(.16)	(.72)	(.17)	(.95)	(.38)
Ethnicity	0.06	0.19	-19.22	0.31	-18.76	-0.98
	(.52)	(.23)	(9383.89)	(.24)	(17549.62)	(.88)
Distance to school			-0.02			
			(.02)			
Wages			0.02			
			(.05)			
Cox & Snell R^2	4.9	16.7	8.3	13.8	5.9	21.4
Nagelkerke R^2	11.8	22.8	24.8	18.5	16.8	31.5
Constant	-1.33	-1.29	33.54	-1.25	17.81	-1.2
	(1.13)	(.37)	(12917.01)	(.4)	(17549.62)	(1.13)
-2 Log Likelihood	211.14	985.65	61.97	803.01	39.82	178.56
Number of cases	430	865	193	666	108	199

Coefficient is the estimated logit coefficient. It is a value for the logistic regression equation for predicting the dependent variable from the independent variable. It is in log-odds units.
SE is the standard error.
* indicates p<.05, ** indicates p<.01, *** indicates p<.001.

As seen in Table 17, academic achievement was statistically significant in Model 7 (national level) and Model 9 (rural only). Academic achievement was also statistically significant in LSS completion (p.70). In addition, when regression models were run with fewer variables, both economic status and parents' education level were statistically significant in Model 8 (national level with fewer variables), Model 10 (rural only with fewer variables), and Model 12 (urban only with fewer variables).

When USS regression models were run with fewer variables, two important differences were found.

First, both economic status and parents' education level were statistically significant as seen in Model 8, Model 10, and Model 12. As in the case of LSS regression models, the three models showed both parents' education level and economic status to have statistically significant relationship with USS completion, regardless of residence, when academic achievement was removed.

Second, there is a noticeable increase in Cox & Snell R^2 and Nagelkerke R^2. For example, a value of 4.9 % in Cox & Snell and of 11.8 % of Nagelkerke in Model 7 (USS national level) was increased to 16.7 % and to 22.8 %, respectively in Model 8. This change is due to either the different number of independent variables included in regression models or impact of independent variables on a dependent variable. Because independent variables control for the effect of the other independent variables on dependent variable, value of coefficients and explanation power would differ in regression models based on the number of independent variables included or which independent variables included. Like LSS regression analyses, ascriptive factors including gender, residence, and ethnicity were not statistically associated with school completion, except for economic status.

Details for Model 7 (USS national level) and Model 8 (USS national level with fewer variables) are explained in the following tables.

Table 18
Model 7: Logistic Regression Results for USS Completion at the National Level (N=430, 49.6%)

						95% C.I.for EXP(B)	
		B	S.E.	Sig.	Exp(B)	Lower	Upper
Step 1a	Parent education level	.134	.070	.058	1.143	.996	1.312
	Residence	-.013	.522	.980	.987	.355	2.746
	Family type	-.379	.689	.582	.684	.177	2.640
	Gender	.207	.383	.589	1.230	.580	2.608
	Ethnicity	.059	.519	.910	1.060	.384	2.932
	Academic achievement	1.245	.406	.002	3.474	1.567	7.700
	Economic status	.309	.253	.222	1.362	.829	2.237
	Constant	-1.332	1.131	.239	.264		

Table 19
Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	211.136	.049	.118

The value of 3.47 for academic achievement is slightly higher than that of LSS national level data (3.14). In addition, parents' education level was found to be statistically associated with USS completion at $p < .058$. This result can be interpreted such that the influence of parents' education level on USS completion is nearly statistically significant while the influence of parents' education level on LSS completion is not. Model 7 explained the variance in the dependent variable at 4.9 % (Cox & Snell) and at 11.8 % (Nagelkerke).

In Model 8, the analysis was conducted without the academic achievement variable because 50.3 % of the data were missing. This analysis was conducted to determine if regression results would differ when, compared with Model 7. As shown in Model 8, the parents' education level and economic status variables were statistically significant at p <.001 when the academic the achievement variable was removed. Compared to Model 7, Model 8 has an increased explanatory power by 11.8 % (Cox & Snell) and 11 % (Nagelkerke) of the variance in the dependent variable.

Table 20
Model 8: Logistic Regression Results for USS Completion for National Level with Fewer Variables (N=865, 99.8%)

						95% C.I.for EXP(B)	
		B	S.E.	Sig.	Exp(B)	Lower	Upper
Step 1a	Parents' education level	.235	.029	.000	1.264	1.195	1.337
	Residence	.023	.210	.914	1.023	.678	1.544
	Family type	-.132	.253	.602	.876	.534	1.439
	Gender	-.224	.156	.150	.799	.589	1.084
	Ethnicity	.194	.230	.398	1.214	.774	1.905
	Economic status	.629	.110	.000	1.877	1.513	2.328
	Constant	-1.286	.372	.001	.276		

Table 21
Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	985.650	.167	.228

By removing academic achievement in Model 8 brought this increased explanatory power and two other independent variables to be statistically significant. To examine why this difference observed, this study tested whether a group with the missing variable of academic achievement (n=436) is substantially different from a group with the complete variable set (n=431) in terms of descriptive statistics of dependent variable and independent variables.

As seen in Table 22-1 and Table 22-2, USS completion was significantly different between the two groups. Only 33 % of a group with the missing variable of academic achievement completed USS while 92 % of a group with the complete variable set completed USS.

Table 22-1
Statistics for USS National with the Missing Variable of Academic Achievement

		Economic status	Parents' education level	Residence	Family type	Gender	Ethnicity	USS completion
N	Valid	436	436	436	435	436	436	436
	Missing	0	0	0	1	0	0	0
Mean		-0.166	7.88	.21	.87	.56	.84	.33
SD		1.001	3.089	.408	.338	.497	.368	.472
Skewness		2.193	-.591	1.421	-2.194	-.241	-1.856	.713

Table 22-2
Statistics for USS National with a Complete Variable Set

		Economic status	Parents education level	Residence	Family type	Gender	Ethnicity	USS completion
N	Valid	431	431	431	430	431	431	431
	Missing	0	0	0	1	0	0	0
Mean		0.168	9.04	.25	.91	.46	.9	.92
SD		0.971	2.674	.435	.281	.499	.3	.266
Skewness		1.253	-.622	1.141	-2.963	.145	-2.68	-3.196

The comparison shows a substantial difference in the mean of USS completion rates. The standard deviation of the former is slightly widely dispersed than that of the latter (.47 and .27, respectively).

Furthermore, Table 22-1 and Table 22-2 show that a group with the missing variable of academic achievement has lower parents' education level, more male students, and more non-Kinh students, compared to those in a group with the complete variable set. In particular, the tables show a significant gap in USS completion rate (.33 compared to .92), which indicates a clear difference between the two groups.

Regarding academic achievement variable, the question asked in VLSS was also "what is your academic record in 2005-2006?" Accordingly, responses for students who dropped out of school were coded as "no idea" or "missing". This coding then contributed to the missing data's designation as, biased sample. Ultimately, it seems reasonable to conclude that missing data in academic achievement are not randomly missing

Summary of Findings of Logistic Regression Analyses

This study used logistic regression analyses to identify factors associated with students' completion of secondary school. The research questions examined in the study included the following:

1) To what extent are household variables associated with secondary school completion?

2) To what extent are commune variables associated with secondary school completion?

3) To what extent are gender and ethnicity associated with secondary school completion?

4) To what extent is academic achievement associated with secondary school completion?

Household variables include household income, parents' education level, expenditures for schooling, residence (rural or urban), and family type (single or two-parent). Economic status, a composite variable from household income, expenditures for schooling, and commune wealth, were found to have a positive relationship with both lower secondary and upper secondary school completion. The higher the economic status of a student's' family and commune, the more likely a student was to complete school. Parents' education level was another strong positive factor associated with completion at both the lower and upper secondary school level. It was found that there was no statistical significant relationship between residence and school completion. Family type had a negative statistical significant relationship with LSS completion in rural areas.

This study included three commune variables to examine relationships with school completion: commune wealth, distance to school, and wages for child labor. Because commune wealth was absorbed into economic status, no separate interpretation was addressed. Distance to school had no statistically significant association with school completion in the regression models tested. Wages had a negative statistical significant association with LSS completion in rural areas supporting existing literature in that the

higher the available wages, the more likely students are to work to support their family. In such cases, the opportunity costs of education are higher.

The regression findings of this study showed that school completion at the LSS and USS level was not statistically associated with gender or ethnicity.

This study found that the academic achievement variable is the strongest independent variable explaining secondary school completion in the national-level set for both LSS and USS. However, it appears that the impact of academic achievement may be biased upwards because missing data were not random.

CHAPTER FIVE: DISCUSSION, CONCLUSIONS, AND IMPLICATIONS

This chapter begins with a summary of the research findings. Following this summary, a discussion is offered and implications for policy and practice are addressed. Finally, limitations and recommendations for future research are presented.

Summary of Research Findings

The study conducted a secondary analysis using the 2006 VLSS data to examine the statistical association between 11 independent variables (which were reduced to nine variables due to the use of a composite variable, economic status) and secondary school completion. This research utilized exploratory descriptive analyses, bivariate correlations, and factor analysis. 12 logistic regression models were also run to determine the relationship between various independent variables and completion. Below follows the summary of the four analyses:

First, profile tables for LSS and USS based on descriptive analyses indicated that students from major ethnic groups, two-parent families, and urban areas achieved significantly higher school completion rates at both the LSS and USS level. The difference increased as school levels increased. Female students were more likely to complete secondary school than male students.

Second, academic achievement was the strongest independent variable to explain secondary school completion in Model 1 (LSS at the national level), Model 3 (LSS for rural only), Model 7 (USS at the national level), and Model 9 (USS for rural only).

However, the results of the analyses were found to be biased due to missing data not being random.

Third, the economic status and parents' education level variables were shown to have statistically significant relationships with secondary school completion in six regression models. This result was obtained when academic achievement was removed from regression analyses introducing inflated estimates of parameters. The results may be interpreted as follows: both economic status and parents' education level were positively related to students' academic achievement. When these three variables were included in the same regression model,[23] economic status and parents' education level variables were not statistically significant with school completion. However, when academic achievement was removed, economic status and parents' education level were found to be statistically significant as expected, given the significant correlations among these three variables.

Discussion

Academic Achievement

Academic achievement was included in the study as existing literature identifies it as important on school completion. This study found that the academic achievement variable is the strongest independent variable explaining secondary school completion in the national-level set for both LSS and USS. However, it appears that the impact of academic achievement may be biased upwards because missing data were not

[23] Model 1 (LSS at the national level), Model 3 (LSS for rural only), Model 7 (USS at the national level), and Model 9 (USS for rural only)

random. When academic achievement was removed from regression models, economic status and parents' education level were found to be statistically significant as expected, given the significant correlations among these three variables. Therefore, it is possible that academic achievement is accounted for by economic status and parents' education level in regression models to some extent.

Economic Status and Parents' Education Level

As in many other countries, in Vietnam despite its status as a socialist country, the educational and economic status of parents matter. According to Thanh and Long (2004), household income is considered a critical predictor for secondary school completion since wealthy households tend to send and keep their children at school longer than poor households. The findings of the current research are consistent with the Thanh and Long study.

In addition, studies have consistently shown that parental education level is related to children's academic attainment (Bélanger & Liu, 2004; Blau & Otis, 1967; Brunello & Checchi, 2003; Kerckhoff & Campbell, 1977). More educated parents are more likely than less educated parents to send their children to school for longer periods of time. The level of parental education is expected to be one of the most powerful variables predicting students' continuing education (Li & Tsang, 2002). This study is consistent with the findings of previous research.

Wages

DeJaeghere finds (2005) that children in the secondary school ages are physically more capable of contributing to household work and/or participating in wage-earning activities. Wages for child labor is considered an opportunity cost when children go to school based on human capital theory. The current research found that there is statistically negative relationship between wages for child labor and lower secondary school completion in rural areas. The higher the available wages, the more likely students are to work to support their family. Given household income in rural areas is relatively lower than that in urban areas, the financial burden for children to support families in rural areas can be heavy, preventing them from completing school. Interestingly, there was no statistically relationship between wages for child labor and upper secondary school completion in rural areas. One possible reason for this result is the small difference in child labor wages. Based on the descriptive statistics, the mean difference in wages between LSS and USS was only 300 Vietnamese Dong ($.02) Therefore, there was little variance related to this factor.

Family type

This study found that there is a negative statistical association between family type and lower secondary school completion in rural areas. That is, students with no parents or from single-parent families were more likely to complete LSS. This finding is inconsistent with social capital theory and most existing literature which show that

students from two-parent families are more likely to complete school. The exact reason for this anomaly remains unanswered.

Distance to School

The findings of the current study indicated that there is no statistically significant relationship between the distance to school and secondary school completion. This finding does not support central place theory and existing literature (Christaller, 1966; Holmes, 1999; Johnson, 1970). According to central place theory, people from remote places experience serious disadvantages in both educational and cultural opportunities because these services are mostly available in central region and cities. Students in rural areas are likely to dropout school if school is too far from their home, resulting in lower school completion. However, the findings of this current study did not find a statistical association between the distance to school and school completion. Perhaps the reason for this is that Vietnam is a really densely populated country with many central places and only Northwest Vietnam has really remote areas.

Holmes (1999) argued that distance to lower secondary school is a significant determinant of the final school level achieved by students. Glewwe and Jacoby (1998) indicated that in Vietnam, the distance to the nearest lower secondary school was one of the most significant factors contributing to the LSS completion rate. The contradictory results of the latter study and this current study may be explained by important changes over time and by different numbers of lower secondary schools. The study by Gewwe and Jacoby used the 1992-93 VLSS. Since the late 1990s, however, the Vietnamese

government has built many more lower secondary schools to make schooling more accessible for students in rural areas. The distance to school and travel time has been shortened and, distance may not be as influential a factor on school completion as it was in the early 1990s.

Ethnicity, Gender, and Residence

The results of the current study showed no statistically significant associations between school completion and ethnicity, gender, and residence. These results do not support the findings in many existing studies (Bélanger & Liu, 2004; Rew, 2008; World Bank, 2008). Rew (2008) suggested a discrepancy between the Kinh and the other ethnic groups with respect to Gini coefficients and average years of schooling. Bélanger and Liu (2004) indicated that gender is a significant factor for explaining school dropout rates in Vietnam, and the World Bank (2008) showed that residence (rural or urban) is related to the completion of secondary school. In addition, Levy's modernization theory (1996) argues that ascriptive factors are powerful explanatory ones in developing countries. Ascriptive factors in an educational context refer to educational disadvantages related to ethnicity, gender, and social class, but not to disadvantages based on ability or merit. The present study did, however, confirm Levy's theory in that economic status was associated with school completion.

Implications

The results of the current study also support the view that economic status is associated with school completion. The descriptive analyses for LSS and USS in the current study indicate a considerable increase (13.9%) in expenditures for schooling. The increase reflects the relatively higher costs necessary to support students in USS as compared to LSS. Therefore, to achieve universal education as stipulated in the Vietnam National Education All Action Plan 2003-2015 (MOET, 2003) and improving the USS completion rate, Vietnamese policy makers must consider strategies to achieve greater fiscal neutrality so that Vietnamese children, regardless of economic status, have opportunities to complete lower and upper secondary education. The Vietnamese government should consider targeting areas where parents have low income and/or education as a way to enhance fiscal neutrality and provide quality education for all.

The Vietnamese government might consider providing better opportunities for non-Kinh and students in remote rural locations to have access to quality secondary schooling. Since regression analyses controlled for economic status, the impact of ethnicity and residence on school completion was not statistically significant. This is understandable since individuals of these backgrounds of higher economic status do well. However, it is clear that a significant completion rate gap exists based on the descriptive analyses, which actually provide a more realistic assessment of the serious disadvantages faced by non-Kinh and students in remote areas. Also the bivariate correlations for LSS illustrate that there are moderate positive correlations (Pearson and Cramer's V) between ethnicity and other key variables; academic achievement (.16), economic status (.15),

parents' education level (.26), and LSS completion (.14). In addition, residence has similar correlations with such variables. Therefore, these two variables should be seriously considered. Given Vietnam's rigorous efforts to eliminate any disparity in school completion rates by 2015, it is imperative to improve opportunities for non-Kinh and for students in remote rural areas as well.

Limitations of the Study

This study includes a comprehensive set of variables which are predicted to influence the probability of secondary school completion based on the 2006 VLSS.

Two commune variables, distance to school and wages, were only available for rural areas and no data were available for urban areas. Therefore, regression analyses for rural areas only were conducted including these two commune variables.

The 2006 VLSS have significant missing data for three independent variables: academic achievement (both rural and urban areas), distance to school (rural only), and wages (rural only). Therefore, results of these analyses must be interpreted with considerable caution.

There are three common kinds of errors in doing regression analyses. First, there is potential sampling error. In this study, due to the systematic pattern of missing data for academic achievement, sampling error occurs which may lead to biased results in certain models tested. Second, errors from multicollinearity may arise. Given that the three

variables of academic achievement, economic status, and parents' education level are statistically correlated, the coefficients of regression analyses may be unstable, though not biased. By using the composite variable, economic status, in this study, multicollinearity was substantially reduced and, thus, regression coefficients are more stable and reliable. Third, specification error may arise when any critical independent variable is excluded from the model. This can then lead to biased coefficients. Even though these three independent variables have considerable missing data, they were included in regression analyses because they were key variables to answer research questions thus were still valuable in analyzing the data with those variables included.

Using multilevel models such as a hierarchical linear model would be beneficial to diagnose nested effects of individual (at a lower level) within an aggregate unit (at a higher level), here in commune variations on school completion. Due to the small student samples per commune, a multilevel model analysis was not conducted.

While the type of family (single-parent, two-parent) and parents' education level are important parts of family structure and resources, these variables have a limitation in capturing "who is related to whom and in what context" which is key to reveal "how, why, and where" the social capital is generated.

Due to the limited data from this study some proxy measures were adopted. For example, this study used proxies such as commune wealth from average three household income in a commune. It was therefore unable to provide an accurate snapshot of the commune population.

Future Research

Future research would need to include academic achievement with minimal missing data in order to examine its possibly important statistical association with secondary school completion. Given the importance of academic achievement in Vietnam with its strong Confucius traditions, studies need to be done including reliable and relatively complete data on academic achievement.

School-related factors were not examined in this study due to limited information obtained from the data set used. This may be an important consideration for future research. Further research needs to examine the role of the school environment together with individual and household characteristics to show how much influence each of these factors has on children's school completion. The *Young Lives* study can be a good example in that it links household and child characteristics from the household survey with children's achievements inside and outside the school (Duc, L. T., Ngoc, N. P., Chau, T. M., Tien, N. V., & Son, V. T, 2008).

In addition, this researcher aggregated 53 ethnicities into the non-Kinh group due to sample size issues. Therefore, the characteristics of those ethnic groups would be different if treated separately, and thus results of the current study may not reflect accurate characteristics of ethnic groups and are underspecified. For example, Hoa and Chinese ethnic groups have shown school enrollment and survival rates as high as that of Kinh group. However, students from Hmong, Khmer, Ba-na, Xo-dong, and Dao have shown only one-third of school enrollment compared to Kinh group (DeJaeghere, 2005).

Therefore, future studies using detailed disaggregated data on ethnicity would be helpful to examine a more accurate picture of the school completion issue.

Recommendations for Any Future VLSS Type Surveys

While the 2006 VLSS data provided comprehensive information on education, health, and various living standards, a few recommendations are presented for consideration related to any future surveys of this type. These suggestions are based on the 2006 VLSS, and do not necessarily reflect any changes adopted since the administration of the 2006 survey.

First, regarding children's academic achievement, if questions are answered by students or parents who know children's academic achievement accurately, it would make data more reliable. Based on the 2006 VLSS manual, respondents to the survey are vaguely described as household members. Therefore, it is hard to know the accuracy of the information on academic achievement reported.

Second, changing from categorical variable into a continuous one for academic achievement factor in the survey would allow for more exact and precise measurement.

Third, it would have been extremely helpful if there were a question to ask what jobs are available in a commune after secondary school. Job availability after school graduation may influence parents' decision to support their children's education. Though knowing returns of education or benefits from school completion, parents may not send their children to school if good jobs are not available in their commune or nearby communes.

Fourth, having a much larger sample of households in each commune would enhance better external validity to measure commune wealth. In the 2006 VLSS there were only three representative households sampled per commune.

Fifth, assigning schools identification number in the survey would be helpful to identify which schools children attend. The 2006 VLSS does not have this information. Thus it was unfortunately not possible to connect school variables to students. Having school information combined with household, individual, and commune variables would result in a better explanatory model for secondary school completion with less specification error.

Concluding Reflections

Vietnam, a developing economy, has attracted considerable international attention because it has achieved rapid economic development while successfully reducing poverty and avoiding the severe inequalities found in many capitalist developing economies, such as Brazil and Thailand. Although it is located in Southeast Asia and is a member of the ASEAN international regime, Vietnam's education and development pattern appears in accord with the East Asian model that has been promoted by the World Bank as exemplary and that was reflected in Chenery's important concept of "growth with equity" (Ahluwalia, M. S., Bell, C. L. G., & Chenery, H., 1974). Related to the growth with equity issue, data from the present study are also consistent with those on Vietnam in the new UNESCO monograph on the expansion of higher education in Asia (Chapman & Chien, 2014).

Data from this study, however, indicate persisting educational policy challenges, namely, to increase completion rates for those of lower socioeconomic status, those in remote rural areas, and those of diverse ethnic backgrounds. Only then can Vietnam reach its goal of universal secondary education and realization of enhanced human capital development.

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APPENDICES

APPENDIX A: Correlations of Independent Variables for Lower Secondary School

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Household Income	____	.153**	.491**	.285**	.045	-.048	.101**	.172**	.806**	-.065	.104**	.117**	
2. Parents' Education level	.153**	____	.295**	.214**	.107*	.023	.19**	.225**	.17**	-.161**	.094*	.414**	2.33**
3. Expenditure for schooling	.491**	.295**	____	.271**	-.003	-.001	.162**	.194**	.447**	-.079	.051	.278**	
4. Residence	.285**	.214**	.271**	____	-.047	.002	.108**	.143**	.449**	.a	.a	.095**	3.96**
5. Family type	.045	.107*	-.003	-.047	____	-.019	-.003	-.008	.029	-.013	.061	.022	.3
6. Gender	-.048	.023	-.001	.002	-.019	____	-.01	-.123**	-.039	.05	.149**	-.038	-.037
7. Ethnicity	.101**	.19**	.162**	.108**	-.003	-.01	____	.128**	.132**	-.18**	.29**	.135**	.151**
8. Academic achievement	.172**	.225**	.194**	.143**	-.008	-.123**	.128**	____	.196**	-.052	.07	.089**	.217**
9. Commune wealth	.806**	.17**	.447**	.449**	.029	-.039	.132**	.196**	____	-.006	.158**	.08*	
10. Distance to school	-.065	-.161**	-.079	.a	-.013	.05	-.18**	-.052	-.006	____	-.171**	-.162**	-.06
11. Wages	.104**	.094*	.051	.a	.061	.149**	.29**	.07	.158**	-.171**	____	-.004	.129**
12. LSS completion	.117**	.414**	.278**	.095**	.022	-.038	.135**	.089**	.08*	-.162**	-.004	____	.175**
13. Economic status		.233**		.396**	.3	-.037	.151**	.217**		-.06	.129**	.175**	____

Note. **p<.01, *p<.05

APPENDIX B: Correlations of Independent Variables for Upper Secondary School

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Household Income	____	.161**	.421**	.315**	.118**	-.085*	.18**	0.071	.664**	-.098	.057	.177**	
2. Parents' Education level	.161**	____	.262**	.166**	.128**	-.015	.162**	.151**	.124**	-.14**	-.05	.344**	.22**
3. Expenditure for schooling	.421**	.262**	____	.203**	.102**	-.055	.145**	.126**	.279**	-.108*	.115*	.409**	
4. Residence	.315**	.166**	.203**	____	-.003	-.032	.115**	.103*	.427**	.a	.a	.136**	.49**
5. Family type	.118**	.128**	.102**	-.003	____	.015	.03	-.015	-.005	-.06	.055	.044	.09**
6. Gender	-.085*	-.015	-.055	-.032	.015	____	.033	-.138**	-.107**	.049	.224**	-.072*	-.11**
7. Ethnicity	.18**	.162**	.145**	.115**	.03	.033	____	.241**	.179**	-.291**	.271**	.126**	.21**
8. Academic achievement	0.071	.151**	.126**	.103*	-.015	-.138**	.241**	____	.000	-.095	.084	.175**	.08
9. Commune wealth	.664**	.124**	.279**	.427**	-.005	-.107**	.179**	.000	____	-.123*	.143**	.129**	
10. Distance to school	-.098	-.14**	-.108*	.a	-.06	.049	-.291**	-.095	-.123*	____	-.162**	-.175**	-.14**
11. Wages	.057	-.05	.115*	.a	.055	.224**	.271**	.084	.143**	-.162**	____	.114*	.13**
12. USS completion	.177**	.344**	.409**	.136**	.044	-.072*	.126**	.175**	.129**	-.175**	.114*	____	.28**
13. Economic status		.22**		.49**	.09**	-.11	.21**	.08		-.14**	.13**	.28**	____

Note. **p<.01, *p<.05

APPENDIX C: Description of Variables

Description of Variables	Variable Values	Name/Recoded values for analyses
Ethnicity	Head's ethnicity 1= Kinh, 2= Tay,… 54= Roman	0= Non-Kinh, 1= Kinh
House income	House expenditures	
Expenditures for schooling	Educ. Exp. 'best' for 2006 VLSS survey	
Commune wealth	Mean of 3 representative house expenditures sample per commune	
Gender	1= male 2= female	1= male 0= female
Family type	The author created based on householder response	0= single or non- parent, 1= two parent
Residence	1= urban, 2= rural	0= rural, 1= urban
Parent's education level	2A1. Which grade did … finish? (Whoever is higher)	0-12
Time to school	How long does it take to travel to this school…Hour/ minutes	Converts into minutes
Wages per day (Thousand)	What is the daily wages for a farm worker (child) to..	
Completion of LSS/USS	2A3. What is the highest diploma … obtained?	0= no diploma, 1= primary school, 2= lower secondary school, 3= upper secondary school,,,
Student Achievement	2B4. What is ..'s academic record in 2005-2006? 1= distinction, 2= good 3= normal 4= weak, 5= No idea	Recoded to 1= weak, 2= normal, 3= good, 4= distinction, 5= missing